

Science & Religion

SCIENCE
&
Religion

.
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NOTE

THE TWELVE TALKS here printed constitute the series broadcast between September and December 1930. Its purpose was to give 'a personal interpretation of the relation of science to religion by speakers eminent as churchmen, as scientists, and as philosophers ; and to determine, in the light of their varied and extensive knowledge, to what degree the conclusions of modern science affect religious dogma and the fundamental tenets of Christian belief'.

Each author has been free to revise his text. This has made it possible to bring out more clearly some points of difference and agreement and thus, without editorial intervention, to give the series a cohesion which the circumstances of delivery precluded.

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CONTENTS

	PAGE
I PROFESSOR JULIAN HUXLEY	I
II PROFESSOR SIR J. ARTHUR THOMSON	23
III PROFESSOR J. S. HALDANE	37
IV THE RIGHT REV E. W. BARNES, BISHOP OF BIRMINGHAM	55
V PROFESSOR B. MALINOWSKI	65
VI THE VERY REV H. R. L. SHEPPARD, DEAN OF CANTERBURY	83
VII THE REV CANON B. H. STREETER	93
VIII THE REV C. W. O'HARA, S.J.	107
IX PROFESSOR SIR ARTHUR S. EDDINGTON	117
X PROFESSOR S. ALEXANDER	131
XI THE VERY REV W. R. INGE, DEAN OF ST PAUL'S	143
XII DR L. P. JACKS	159
INDEX	173

I

PROFESSOR JULIAN HUXLEY

THIS is a difficult subject, not one that is easy to discuss fully and frankly without arousing angry emotions or bruising intimate and sacred feelings. Yet the task is one which ought to be attempted. In this country, at least we believe in religious freedom. And religious freedom implies the right of everyone to believe what he wants in matters of religion, and to proclaim his belief freely and openly. Provided that a man treats of these things honestly and sincerely, with no desire to sneer at or provoke others, those who differ from him have indeed no right to feel angry or to feel hurt.

I have devoted most of my life to science. This has been largely because I am so made that I want to know about things ; I cannot help valuing knowledge for its own sake, or finding interest and excitement in the pursuit of new knowledge. But I would not continue to devote my energies to science if I did not believe that science was also useful, and, indeed, absolutely indispensable to human progress. It is the only means by which man can go on increasing his power over nature and over the destiny of his race. On the other hand, without being an adherent of any sect, orthodox or unorthodox, I have always been deeply interested in religion, and believe that religious feeling is one of the most powerful and important of human attributes. So here I do not think of myself as a representative of science, but want to talk as a human being who believes that both the scientific and the religious spirit are of the utmost value.

No one would deny that science has had a great effect on the religious outlook. If I were asked to sum up this effect as briefly as possible, I should say that it was two-fold. In the first place, scientific discoveries have entirely altered our general picture of the universe and of man's position in it. And, secondly, the application of scientific method to the study of religion has given us a new science, the science of comparative religion, which has profoundly changed our general views on religion itself. To my mind, this second development is in many ways the more important of the two, and I shall begin by trying to explain why. There was a time when religions were simply divided into two categories, the true and the false ; one true religion, revealed by God, and a mass of false ones, inspired by the Devil. Milton has given expression to this idea in his beautiful 'Hymn on the Morning of Christ's Nativity'. This view, unfortunately, was held by the adherents of a number of different religions—not only by Christians, but also by Jews, Mohammedans and others. And with the growth of intelligent tolerance, many people began to feel doubtful about the truth of such mutually contradictory statements. But the rise of the science of comparative religion made any such belief virtually impossible. After a course of reading in that subject, you might still believe that your own religion was the best of all religions ; but you would have a very queer intellectual construction if you still believed that it alone was good and true, while all others were merely false and bad.

I would say that the most important contribution which the comparative study of religions has made to general thought is broadly this. We can no longer look on religions as fixed : there is a development in religion as

there is in law or science or political institutions. Nor can we look on religions as really separate systems ; different religions interconnect and contribute elements to one another. Christianity, for instance, owes much not only to Judaism, but also to the so-called mystery religions of the near East, and to neo-Platonism.

From this point of view, all the religions of the world appear as different embodiments of the religious spirit of man, some primitive and crude, some advanced and elaborate, some degenerate and some progressive, some cruel or unenlightened, some noble and beautiful, but all forming part of the one general process of man's religious development.

But does there really exist a single religious spirit ? Are there really any common elements to be found in Quakerism, say, and the fear-ridden fetishism of the Congo, or in the mysticism and renunciation of pure Buddhism and the ghastly cruelties of the religion of ancient Mexico ? Here, too, comparative study helps us to an answer. The religious spirit is by no means always the same at different times and different levels of culture. But it always contains certain common elements. Somewhere at the root of every religion there lies a sense of sacredness ; certain things, events, ideas, beings are felt as mysterious and sacred. Somewhere, too, in every religion is a sense of dependence ; man is surrounded by forces and powers which he does not understand and cannot control, and he desires to put himself into harmony with them. And, finally, into every religion there enters a desire for explanation and comprehension ; man knows himself surrounded by mysteries, yet he is always demanding that they shall make sense.

The existence of the sense of sacredness is the most

basic of these common elements ; it is the core of any feeling which can properly be called religious, and without it man would not have any religion at all. The desire to be in harmony with mysterious forces and powers on which man feels himself dependent is responsible for the expression of religious feeling in action, whether in the sphere of ritual or in that of morals. And the desire for comprehension is responsible for the explanations of the nature and government of the universe, and of the relations between it and human destiny, which in their developed forms we call theology.

This is all very well, some of my listeners will have been saying to themselves, but there has been no mention of God and no mention of immortality ; surely the worship of some god or gods, and the belief in some kind of future life are essentials of religion ? Here again, comparative religion corrects us. Those are undoubtedly very general elements of religion ; but they are not universal, and, therefore, not essential to the nature of religion. In pure Buddhism there is no mention of God ; and the Buddhist's chief preoccupation is to escape continued existence, not to achieve it. Many primitive religions think in terms of impersonal sacred forces permeating nature ; and personal gods controlling the world either do not exist for them, or, if they do, are thought of vaguely as creators or as remote final causes, and are not worshipped. And a certain number of primitive peoples either have no belief at all in life after death, or believe that it is enjoyed only by chiefs and a few other important persons.

The three elements I have spoken of seem to be the basic elements of all religions. But the ways in which they are worked out in actual practice are amazingly diverse. To bring order into the study of the hundreds

of different religions known, we must have recourse to the principle of development. But before embarking on this I must clear up one point. I said that an emotion of sacredness was at the bottom of the religious spirit. So it is ; but we must extend the ordinary meaning of the word ' sacred ' a little if we are to cover the facts. For the emotion I am trying to pin down in words is a complex one which contains elements of wonder, a sense of the mysterious, a feeling of dependence or helplessness, and either fear or respect. And not only can these ingredients be blended with each other and with still further elements in very different proportions, so as to give in one case awe, in another case superstitious terror ; in one case quiet reverence, in another ecstatic self-abandonment ; but the resulting emotion can be felt about what is horrifying or even evil, as well as about what is noble or inspiring. Indeed, the majority of the gods and fetishes of various primitive tribes are regarded as evil or at least malevolent ; and yet this quality which I have called sacredness most definitely adheres to them. As Dr Marett points out in one of his books, we really want two words—' good-sacred ' and ' bad-sacred '. It will, perhaps, help to explain what I mean if I remind you that Coleridge in ' Kubla Khan ' uses the word holy in this same equivocal way, of the ' deep romantic chasm ' in Xanadu :

A savage place, as holy and enchanted
As e'er beneath a waning moon was haunted
By woman wailing for her demon-lover.

In most primitive religions the two feelings are intimately blended, and equally balanced ; it is only later that the idea of the ' good-sacred ' gets the upper hand and the ' bad-sacred ' dwindles into a subordinate position, as

applied to witchcraft for instance, or to a Devil who is inferior to God in power as well as goodness. Don't be impatient at my spending some time over these barbaric roots of religion. They may not at first sight seem to have anything to do with our modern perplexities, but they are, as a matter of fact, of real importance, partly because they are fundamental to our idea of what religion is, partly because they represent the base-line, so to speak, from which we must measure religious development. And I repeat that the idea of development in religion is, perhaps, the most important contribution of science to our problem.

In the least developed religions, then, it is universally agreed that magic is dominant. And by magic is meant the idea that mysterious properties and powers inhere in things or events, and that these powers can be in some measure controlled by appropriate formulae or ritual acts.

It is also universally agreed that the ideas behind magic are not true. Primitive man has projected his own ideas and feelings into the world about him. He thinks that what we should call lifeless and mindless objects are animated by some sort of spirit ; and because they have aroused an emotion of fear or mystery in him, he thinks that they are themselves the seat of a mysterious and terrifying power of spiritual nature. He has also used false methods in his attempts at achieving control ; an obvious example is the use of 'sympathetic magic', as when hunting savages kill game in effigy, believing that this will help them to kill it in reality.

But, though this is demonstrably false, a good many magic beliefs still linger on, either still entwined with religion, or disentangled from it as mere isolated superstition, like the superstitions about good and bad luck,

charms and mascots. Anyone who really believes in the efficacy of such luck-bringers is in that respect reasoning just as do the great majority of savages about most of the affairs of their life.

As I said before, in the magic stage, gods may play but a small part in religion. The next great step is for the belief in magic to grow less important, that in gods to become dominant. Instead of impersonal magic-power inherent in objects, man thinks of beings, akin to himself, controlling objects that are themselves inanimate. '

When we study different religions at the beginning of this stage, we find an extraordinary diversity of gods being worshipped. Man has worshipped gods in the semblance of animals ; gods that are represented as half-human and half-bestial ; gods that are obviously deified heroes (in Imperial Rome even living emperors were accorded divine honours) ; gods that are the personification of natural objects or forces, like sun-gods, river-gods or fertility-gods ; tribal gods that preside over the fortunes of the community ; gods that personify human ideals, like gods of wisdom ; gods that preside over human activities, like gods of love or of war.

From these beginnings, progress has been mainly in two directions—ethical and logical. Beginning often by assigning barbaric human qualities to deity, qualities such as jealousy, anger, cruelty or even voluptuousness, men have gradually been brought to higher conceptions. Jehovah was thought of in very different terms after the time of the Hebrew prophets. His more spiritual and universal aspects came to be stressed in place of the less spiritual and more tribal aspects which appealed to the earlier Jews. Many freely in the great age of Greece revolted against the traditional Greek theology which

made the gods lie and desire and cheat like men. A great many Christians have put away the traditional idea of Hell from their theology because they hold fast to a more merciful view of God. We may put the matter briefly by saying that, as man's ethical sense developed, he found it impossible to go on ascribing 'bad-sacred' elements to Divine personality, and came to hold an ethically higher idea of God.

On the logical side, the natural trend has been towards unity and universality. You must acknowledge that the many incomplete and partial gods of polytheism give place to a complete and single God ; waning tribal gods give place to the universal God of all the world. What exactly this means, whether man, as his powers develop, is seeing new aspects of God which previously he could not grasp, whether he is investing with his own ideas something which is essentially unknowable, or whether, as some very radical thinkers believe, the concept of God is a personification of impersonal powers and forces in nature, it is not possible to discuss here. What is assuredly true is that man's idea of God gradually alters, and becomes more exalted. Theology develops ; and with the change in theology, religious feeling and practice alter too.

At the moment a new difficulty is cropping up as a result of the progress of science. If nature really works according to universal automatic law, then God, regarded as a ruler or governor of the universe, is much more remote from us and the world's affairs than earlier ages imagined. Modern theology is meeting this by stressing the idea of divine immanence in the minds and ideals of men. But this and other possible solutions of this very real difficulty I have no time to discuss, and can only hope that other speakers in this series will treat of them.

Here I must get back to the general idea of religious development. There is one rather curious fact about this. The intensity of religious feeling may be as great, the firmness of belief as strong, in the lowest religions, as they are in the highest. The difference between a low and a high religion is due to the ethical and moral and intellectual ideas that are interwoven with the religious spirit, that colour it and alter the way it expresses itself in action. The spiritual insight of the Hebrew prophets could not tolerate the idea that material sacrifices and burnt offerings were the best means of propitiating God, and they inaugurated a new and higher stage in Hebrew religion, epitomised in the words of the psalmist : 'The sacrifices of God are a broken spirit ; a broken and a contrite heart, O God, Thou wilt not despise.' Jesus could not tolerate the idea that forms and ritual observances were the road to salvation, and inaugurated not only a new religion but a new phase in world history by His insistence on purity of heart and self-sacrifice, epitomised in the words 'The Kingdom of Heaven is within you'. Paul could not tolerate the idea that God would offer salvation to one nation only, and made of Christianity a world-religion for the Jews.

Those are cases where the new insight was from the start applied directly to religion. But often the new ideas begin their career quite independently of religion, and only later come to influence it. Orthodox religion, for instance, was on the whole favourable to the institution of slavery.

The abolition of slavery was due at least as much to new humanitarian and social ideas, often regarded as heterodox or even subversive, as to religious sentiment. But the change in public sentiment once effected, it had a marked

effect on religious outlook. The same sort of thing could be said about our changed ideas on the use of torture, on the treatment of criminals, prisoners and paupers and insane people, and many other subjects.

But it is in the intellectual sphere, during the last few centuries at least, that changes which in origin were unrelated to religion have had the most considerable effect upon the religious outlook. Those who are interested will find a lucid and thought-provoking treatment of the whole subject in Mr Langdon-Davies's new book, *Man and His Universe*. Here I must content myself with two brief examples. When Kepler showed that the planets moved in ellipses instead of circles, when Galileo discovered craters on the moon, spots on the sun, or showed that new fixed stars could appear, their discoveries were not indifferent to religion as might have been supposed. On the contrary, they had as much influence on the religious outlook of the day as had the ideas of Darwin on the religious outlook of the Victorian age, or as the ideas of Freud and Pavlov are having on that of our own times. For to the Middle Ages a circle was a perfect form, an ellipse an imperfect one ; and the planets ought to move in circles to justify the perfection of God. So, too, mediæval religious thought was impregnated with the idea (which dates back to Aristotle) that change and imperfection were properties of the sublunary sphere—the earth alone. All the heavenly regions and bodies were both perfect and changeless. So that the discoveries of imperfections, like the sun's spots or the moon's pock-marks, or of celestial changes like the birth of a new star, meant an overhauling of all kinds of fundamental ideas in the theology of the time.

As a second example, take Newton. We are so used

to the idea of gravity that we forget what a revolution in thought was caused by Newton's discoveries. Put simply, the change was this. Before Newton's time, men supposed that the planets and their satellites had to be, in some way, perpetually guided and controlled in their courses by some extraneous power, and this power was almost universally supposed to be the hand of God. Then came Newton, and showed that no such guidance or controlling power was, as a matter of fact, needed ; granted the universal property of gravity, the planets could not help circling as they did. For theology, this meant that men could no longer think of God as continually controlling the details of the working of the heavenly bodies ; as regards their aspect of the governance of the universe, God had to be thought of as one removed farther away, as the designer and creator of a machine which, once designed and created, needed no further control. And this new conception did, as a matter of historical fact, exert a great influence on religious thought, which culminated in Paley and the Bridgwater School, early in the last century.

It is considerations like these which lead us on to what is usually called the conflict between science and religion. If what I have been saying has any truth in it, however, it is not a conflict between science and religion at all, but between science and theology. The reason it is often looked on as a conflict of science with religion is that the system of ideas and explanations and reasonings which crystallises out as a theology tends to become tinged with the feeling of sacredness which is at the heart of religion. It thus gets looked on as itself sacred, not to be interfered with, and does, in point of fact, become an integral part of the particular religion at its particular stage of

development. So we may, if we like, say that science can be in conflict with particular stages of particular religions, though it cannot possibly be in conflict with religion in general.

Now the man of science, if he is worth his salt, has a definitely religious feeling about truth. In other words, truth is sacred to him, and he refuses to believe that any religious system is right or can satisfy man in his capacity of truth-seeker, if it denies or even pays no attention to the new truths which generations of patient scientific workers painfully and laboriously wrest from nature. You may call this a provocative attitude if you like ; but on this single point the scientist refuses to give way, for to do so would be for him to deny himself and the faith that is in him—the faith in the value of discovering more of the truth about the universe. He knows quite well that what he has so far discovered is the merest fraction of what there is to know, that many of his explanations will be superseded by the progress of knowledge in the future. But he also knows that the accumulated effect of scientific work has been to produce a steady increase in the sum total of knowledge, a steady increase in the accuracy of the scientific explanation of what is known. In other words, scientific discovery is never complete, but always progressive ; it is always giving us a closer approximation to truth.

Thus, knowing as he does that both science and religion have grown and developed, and believing that they should continue to do so, he does not feel he is being subversive, but only progressive, in what he asks. And what he asks is that religion, on its theological side, shall continue to take account of the changes and expansions of the picture of the universe which science is drawing. I say *continue*,

for it has done so in the past, although often grudgingly enough. It gave up the idea of a flat earth ; it gave up the idea that the earth was the centre of the universe, or that the planets moved in perfect circles ; it gave up the idea of a material heaven above a dome-like sky, and accepted the idea of an enormous space peopled with huge numbers of suns, and indeed with other groups of suns each comparable to what we for long thought was the whole universe ; it accepted Newton's discovery that the heavenly bodies need no guidance in their courses, and the discoveries of the nineteenth-century physicists and chemists about the nature of matter ; it has abandoned the idea that the world is only a few thousand years old, and accepted the time-scale discovered by geology. And it finds itself no worse off for having shed these worn-out intellectual garments. But there are still many discoveries of science which it has not yet woven into its theological scheme. Only certain of the Churches have accepted Evolution, though this was without doubt the most important single new idea of the nineteenth century. It has not yet assimilated recent advances in scientific knowledge of the brain and nervous system, of heredity, of psychology, or of sex and the physiology of sex. And, in a great many cases, while accepting scientific discoveries, it has only gone half-way in recasting its theology to meet the new situation.

But whatever this or that religion may choose to do with new knowledge, man's destiny and his relation to the forces and powers of the world about him are, and must always be, the chief concerns of religion. It is for this reason that any light which science can shed on the nature and working of man and the nature and working of his environment cannot help being relevant to religion.

What, then, is the picture which science draws of the universe to-day, the picture which religion must take account of (with due regard, of course, for the fact that the picture is incomplete), in its theology and general outlook? It is, I think, somewhat as follows. It is the picture of a universe in which matter and energy, time and space are not what they seem to common sense, but interlock and overlap in the most puzzling way. A universe of appalling vastness, appalling age, and appalling meaninglessness. The only trend we can perceive in the universe as a whole is a trend towards a final uniformity, when no energy will be available, a state of cosmic death.

Within this universe, however, on one of the smaller satellites of one of its millions of millions of suns, a different trend is in progress. It is the trend we call evolution, and it has consisted first in the genesis of being out of non-living matter, and then in steady but slow progress of this living matter towards greater efficiency, greater harmony of construction, greater control over and greater independence of its environment. And this slow progress has culminated, in very recent times, geologically speaking, in the person of man and his societies. This is the objective side of the trend of life; but it has another side. It has been a trend towards greater activity and intensity of mind, towards greater capacities for knowing, feeling, and proposing; and here, too, man is pre-eminent.

The curious thing is that both these trends, of the world of lifeless matter as a whole, and of the world of life on this planet, operate with the same materials. The matter of which living things are composed is the same as that in the lifeless earth and the most distant stars; the energy

by which they work is part of the same general reservoir which sets the stars shining, drives a motor-car, and moves the planets or the tides. There is, in fact, only one world-stuff, only one flow of energy. And since man and life are part of this world-stuff, the properties of consciousness or something of the same nature as consciousness must be attributes of the world-stuff, too, unless we are to drop any belief in continuity and uniformity in nature. The physicists and the chemists and the physiologists do not deal with these mind-like properties, for the simple reason that they have not so far discovered any method of detecting or measuring them directly. But the logic of evolution forces us to believe that they are there, even if in lowly form, throughout the universe. Finally, this universe which science depicts works uniformly and regularly. A particular kind of matter in a particular set of circumstances will always behave in the same way; things work as they do, not because of inherent principles of perfection, not because they are guided from without, but because they happen to be so made that they cannot work in any other way. When we have found out something about the way things are made so that we can prophesy how they will work, we say we have discovered a natural law; such laws, however, are not like human laws, imposed from without on objects, but are laws of the objects' own being. And the laws governing the evolution of life seem to be as regular and automatic as those governing the movements of the planets.

In this universe lives man. He is a curious phenomenon: a piece of the universal world-stuff which as the result of long processes of change and strife has become intensely conscious—conscious of itself, of its relations with the rest of the world-stuff. capable of consciously

feeling, reasoning, describing and planning. These capacities are the result of an astonishingly complicated piece of physical machinery—the cerebral hemispheres of the brain. The limitations to our capacities come from the construction of our brains and bodies which we receive through heredity ; with someone else's body and brain, our development even in the same environment could have been different. And these differences in human capacity due to differences in inheritance may be enormous. The method of inheritance in men is identical in principle with the method of inheritance in poultry or flies or fish. And by means of further detailed knowledge we could control it, and therefore control human capacity, which is only another way of saying that man has the power of controlling his own future ; or, if you like to put it still more generally, that not only is he the highest product of evolution, but that, through his power of conscious reason, he has become the trustee of the evolutionary process. His own future and that of the earth are in large measure in his hands. And that future extends for thousands of millions of years. Lastly, we must not forget to remind ourselves that we are relative beings. As products of evolution, our bodies and minds are what they are because they have been moulded in relation to the world in which we live. The very senses we possess are relative—for instance, we have no electric sense and no X-ray sense, because electrical and X-ray stimuli of any magnitude are very rare in nature. The working of our minds, too, is very far from absolute. Our reason often serves only as a means of finding reasons to justify our desires ; our mental being, as modern psychology has shown, is a compromise—here antagonistic forces in conflict, there an undesirable element

forcibly repressed, there again a disreputable motive emerging disguised. Our minds, in fact, like our bodies, are devices for helping us to get along somehow in the struggle for existence. We are entrapped in our own natures. Only by deliberate effort, and not always then, shall we be able to use our minds as instruments for attaining unvarnished truth, for practising disinterested virtue, for achieving true sincerity and purity of heart.

I do not know how religion will assimilate these facts and these ideas ; but I am sure that in the long run it will assimilate them as it has assimilated Kepler and Galileo and Newton and is beginning to assimilate Darwin ; and I am sure that the sooner the assimilation is effected, the better it will be for everybody concerned.

So far I have spoken almost entirely of the effect of science upon the religious outlook : of the effect of scientific method upon the study of religion itself, leading us to the idea of development in religion ; and of the effect of scientific discoveries in general upon man's picture of the universe, which it is the business of religion to assimilate in its theology. Now, I must say something about the limitations of science. Science, like art, or morality, or religion, is simply one way of handling the chaos of experience which is the only immediate reality we know. Art, for instance, handles experience in relation to the desire for beauty, or, if we want to put it more generally and more philosophically, in relation to the desire for expressing feelings and ideas in æsthetically satisfying forms ; accuracy of fact is and should be a secondary consideration. The annual strictures of the *Tailor and Cutter* on the men's costumes in the Academy portraits are more or less irrelevant to the question of whether the portraits are good pictures or bad pictures.

Science, on the other hand, deals with the chaos of experience from the point of view of efficient, intellectual, and practical handling. Science is out to find laws and general rules, because the discovery of a single law or rule at once enables us to understand an indefinite number of individual happenings—as the single law of gravitation enables us to understand the fall of an apple, the movement of the planets, the tides, the return of comets, and innumerable other phenomena.

Science insists on continual verification by testing against facts, because the bitter experience of history is that without such constant testing, man's imagination and logical faculty run away with him and in the long run make a fool of him. And science has every confidence in these methods of hers because experience has amply demonstrated that they are the only ones by which man can hope to extend his control over nature and his own destiny. Science is in the first instance merely disinterested curiosity, the desire to know for knowing's sake; yet in the long run the new knowledge always brings new practical power.

But science has two inherent limitations. First, it is incomplete, or perhaps I had better say partial, just because it only concerns itself with intellectual handling and objective control. And secondly, it is morally and emotionally neutral. It sets out to describe, and to understand, not to appraise nor to assign values. Indeed, science is without a scale of values: the only value which it recognises is that of truth and knowledge.

This neutrality of science in regard to emotions and moral and æsthetic values means that while in its own sphere of knowledge it is supreme, in other spheres it is only a method or a tool. What man shall do with the

new facts, the new ideas, the new opportunities of control which science is showering upon him does not depend upon science, but upon what man wants to do with them ; and this in turn depends upon his scale of values. It is here that religion can become the dominant factor. For what religion can do is to set up a scale of values for conduct, and to provide emotional or spiritual driving force to help in getting them realised in practice. On the other hand, it is an undoubted fact that the scale of values set up by religion will be different according to the intellectual background of the religion. You can never wholly separate practice from theory, idea from action. Thus, to put the matter in a nutshell, while the practical task of science is to provide man with new knowledge and increased powers of control, the practical task of religion is to help man to decide how he shall use that knowledge and those powers.

The conflict between science and religion has come chiefly from the fact that religion has often been afraid of the new knowledge provided by science, because it had unfortunately committed itself to a theology of fixity instead of one of change, and claimed to be already in possession of all the knowledge that mattered. It therefore seemed that to admit the truth and the value of the new knowledge provided by science would be to destroy religion. Most men of science and many thinkers within the churches do not believe this any longer. Science may destroy particular theologies ; it may even cause the downfall of particular brands of religion if they persist in refusing to admit the validity of scientific knowledge. But it cannot destroy religion, because that is the outcome of the religious spirit, and the religious spirit is just as much a property of human nature as is the scientific spirit.

What science can and should do is to modify the form of religion. And once religion recognises that fact, there will no longer remain any fundamental conflict between science and religion, but merely a number of friendly adjustments to be made.

In regard to this last point, let me make myself clear. I do not mean that science should dictate to religion how it should change or what form it should take. I mean that it is the business and the duty of the various religions to accept the new knowledge we owe to science, to assimilate it into their systems, and to adjust their general ideas and outlook accordingly. The only business and duty of science is to discover new facts, to frame the best possible generalisations to account for the facts, and to turn knowledge to practical account when asked to do so. The problem of what man will do with the enormous possibilities of power which science has put into his hands is probably the most vital and the most alarming problem of modern times. At the moment, humanity is rather like an irresponsible and mischievous child who has been presented with a set of machine tools, a box of matches, and a supply of dynamite. How can religion expect to help in solving the problem before the child cuts itself or blows itself up, if it does not permeate itself with the new ideas, and make them its own in order to control them? That is why I say—as a human being and not as a scientist—that it is the *duty* of religion to accept and assimilate scientific knowledge. I also believe it to be the *business* of religion to do so, because if religion does not do so, religion will in the long run lose influence and adherents thereby.

I would like to finish by pulling together some of the main threads of my argument. I see the human race engaged on the tremendous experiment of living on the

planet called Earth. From the point of view of humanity as a whole, the great aim of this experiment must be to make life more truly and more fully worth living ; the religious man might prefer to say that the aim was to realise the kingdom of God upon earth, but that is only another way of saying the same thing.

The scientific spirit and the religious spirit have both their parts to play in this experiment. If religion will but abandon its claims to fixity and certitude (as many liberal churchmen are already doing), then it can see in the pursuit of truth something essentially sacred, and science itself will come to have its religious aspect. If science will remember that it, as science, can lay no claim to set up values, it will allow due weight to the religious spirit. At the moment, however, a radical difference of outlook obtains between science and religion. An alteration in scientific outlook—for instance, the supersession of pure Newtonian mechanics by relativity—is generally looked on as a victory for science ; but an alteration in religious outlook—for instance, the abandonment of belief in the literal truth of the account of creation in Genesis—is usually looked on as in some way a defeat for religion. Yet either both are defeats or both victories—not for partial activities, such as religion or science, but for the spirit of man. In the past, religion has usually been slowly and grudgingly forced to admit new scientific ideas ; if it will but accept the most vivifying of all the scientific ideas of the past century, that of the capacity of life, including human life and institutions, for progressive development, the conflict between science and religion will be over, and both can join hands in advancing the great experiment of man—of ensuring that he shall have life, and have it more abundantly.

II

PROFESSOR SIR J. ARTHUR THOMSON

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WHAT should we rank as Man's greatest achievements ? Some would place first his making of societies—often chequered with imperfections, yet always far above not only herd but hive. Others would emphasise his conquest of many of the forces of Nature, notably electricity, which he has harnessed in his service in scores of ways. But others would think more of the arts—poetry and painting, music and architecture, with their unique power of expressing the inexpressible. So we might continue, but, whatever the order, the list must include *Science*, which makes the world translucent, and *Religion*, which hitches our wagon to a star.

Now while it is more profitable to have a fierce controversy over great questions than to be for ever amiable over trivialities, it seems in some measure wasteful that two of man's greatest achievements—Science and Religion—should be so often pitted against one another. Would it not be better to spend the time and energy in gaining more science and more religion, for none of us has too much of either ? Suppose it be allowed that religion, like science, is a natural and necessary activity of the evolving spirit of man ; that both Religion and Science in pure form are inherently noble ; that both, apart from perversions, make for the enrichment of life : then it seems a pity that they should be so often opposed as antithetic. Our first point is that, as regards essentials,

the conflict between Science and Religion is very largely a false antithesis. It is due to a failure to understand the different aims and methods and ideas of the two great activities. This raises the questions : *What is Science?* and *What is Religion?*

Science is a system of criticised knowledge, giving empirical descriptions of things and changes, expressed in the simplest and tersest terms ; it is based on experiment and observation, and verifiable by all normally constituted minds who can use the methods. Science aims at descriptive formulation in terms of the lowest common denominators available at the time, such as Electrons, Radiations, Protoplasm, and Mind—the measure of all. It seeks to answer the questions : *What is this? Whence is it? How does it come to be as it is, and how does it continue in being?* and sometimes *Whither away?* as when we contemplate an evolving species or a dying star. But Science as science never asks the question *Why?* That is to say, it never inquires into the meaning, or significance, or purpose of this manifold Being, Becoming, and Having Been. That is not its métier.

For many years now it has been recognised by all the great makers of new knowledge, that the aim of Science is *descriptive*. Science sums up in so-called ‘Laws’, which are intellectual shorthand formulæ describing uniformities of sequence—‘If this, then that,’ in short. It is rather pedantic to say that science never *explains* anything, but it is true to say that its explanations are never in terms of purpose, or deep-down meaning. They simply amount to saying something like this : These puzzling occurrences are instances of Laws 3, 7, and 10 : or, This state of affairs is the natural and necessary

outcome of a long process of evolution, in which the following stages and factors can be recognised. Thus science does not pretend to be a bedrock of truth. It is an indispensable, yet partial and abstract, kind of knowledge—partial and abstract because it must restrict itself, if it is true to itself, to certain methods. To change the metaphor, science fishes in the sea of reality with particular kinds of net—called scientific methods—and there may be much in the unfathomed sea which the meshes of the scientific net cannot catch. Thus the geologist as geologist does not consider the beauty of the country-side, though that is as real to us as its mineralogy. The astronomer, as astronomer, aims at a chemico-physical account of the nebular mass that gave rise to our Solar System, but he does not raise the point that from out of it there somehow emerged on our earth a complex world of life, including the astronomer himself. He abstracts the nebula from its remote results.

Science has not always been so modest, but we must deal with the science of to-day, and all its leaders are agreed that as scientific investigators they deal only with descriptions of what meets the eye—the scientific eye, of course, which can see the invisible. They are not concerned with anything ultimate, or with any question of the beginning or the ending, or with the purpose or meaning of it all. Science makes the world increasingly intelligible ; but it does not even ask whether it is or is not rationalisable.

What then is Religion ? In the course of the ages man has often become religious when he struggled poignantly to the limit of his reach—in doing, feeling, or thinking. In his struggle with a callous environment—storms, wild beasts, drought, floods, fire, famine—man has often found

himself balked and helpless. At the limit of his practical effort he became religious, stretching out his hands towards a supposed super-sensuous dynasty, towards unseen Powers, towards an unknown God. Whether he offered propitiatory gifts, or burnt incense, or prayed, matters not for our purpose here ; the religious note is the appeal to some spiritual power. Nowadays, when man's mastery of Nature is so far-reaching, this practical pathway to religion is not much trodden, except by those who take very seriously their failures to live a good life. Modern man rarely prays for rain or for its cessation.

In the second place, man has often found himself overwhelmed by emotional stress—high joys, deep sorrows, the æsthetic thrill, a sense of mystery, the feeling of awesomeness or, as Professor Julian Huxley calls it, sacredness. An overwhelming surge of emotion has led many to religion in the past, and this emotional pathway remains wide open to-day, all the more since science in dissolving minor mysteries leaves the wonder of the world confessed. When the half-gods go, the God may arrive.

The third pathway to religious activity is found by some of those who strain hard at the limit of their intellectual reach. Science discloses a very impressive world—immense, intricate, orderly, progressive : it is difficult not to try to make sense of it as a whole. Has evolution some meaning ? Is there any spiritual reality behind it all ? Are we part of a great purpose ? And so the perennial questions have arisen century after century, and are arising still. Some philosophies seek to answer ; and religion, on its intellectual side, is often the layman's naïve philosophy.

In past ages man's religious activity has naturally found

practical, emotional, and intellectual expression. Practical, for instance, when he offered propitiatory sacrifice or a life's devotion ; emotional, for instance, when he worshipped ; and intellectual, for instance, when he clutched at some interpretative idea or theory or 'over-belief'. All three expressions remain to-day.

Robert Bridges wrote a famous essay on 'The Necessity of Poetry' ; so one may speak, if one believes in it, of 'The Necessity of Religion'—the necessity of beliefs to which men are led when they strain at the limits of their practical, emotional, or intellectual reach. To my thinking, the religious 'over-beliefs', except in the low grade or degraded form that we call magic, always imply something beyond ordinary experience, something spiritual or mystical. We hitch our wagon to a star ; we send tendrils towards the absolute ; we believe in God. Thus, there is little that is specifically religious in the idea of a god who is but the sum-total of the physical energies in the Universe. For such a god is still no more than a physical quantity. The God we would worship is spiritual. In the words of the Shorter Catechism, 'God is a Spirit, Infinite, Eternal, and Unchangeable in His Being, Wisdom, Power, Holiness, Justice, Goodness, and Truth'.

Here then we come back to our thesis, that if science is descriptive formulation and if religion (on its intellectual side) is a transcendental or mystical interpretation, there should not be any *radical* antithesis between them. Such a sorry cry as 'The Bible *or* Darwin' illustrates the false antithesis, sounding like 'Food *or* Fresh Air' ; the plain answer in both cases being 'More of both'.

Our point is that Science describes in terms of the lowest common denominators available ; Religion

interprets in terms of the greatest common measure. In essence they are incommensurables. There is no contradiction in saying in one sentence that Man evolved by natural processes from a Simian stock, and saying in another sentence that man is the child of God. But we must not try to speak two languages at once.

Our thesis is open to three obvious objections. The first is on the part of those who declare that they feel no necessity for religion. They are satisfied with the knowledge that science affords ; they do not strain at the limit of their intellectual reach ; they are content not to try to explain or interpret things ; they distrust as an anachronism the feeling of mystery that remains after the scientific concepts have formulated all they can ; they have no sense of the mystical, just as others have no ear for music. What can we reply to these stern spirits, save that most men, above the preoccupiedly grazing herd, will insist on putting the question Why ? and on getting some answer ; and furthermore that there is a hint of arrogance in dogmatically declaring that the only kind of trustworthy knowledge is that which is reached by scientific methods. Surely, science is not the only pathway to reality or to truth.

The second objection to our thesis—that science and religion speak different languages—is that it involves a relapse to the device of trying to have idea-tight compartments in the mind. We are asked : Is not your thesis too much like saying : Hold to your scientific formulæ and hold to your religious over-beliefs, but don't let them mix. Render unto Science the things that are Science's and unto Religion the things that are Religion's, but try to keep the rendering for different days of the week. But this is a caricature of our view. While we maintain that

science and religion are two quite different ways of looking at things, and to be kept apart, we cannot contemplate giving houseroom to any religious conviction, or expression of a religious conviction, that is obviously contradicted by some securely established scientific conclusion. There must be consistency. Nor do we think of two domains, preserves for science and preserves for religion : all things are for religion and all things for science, save that by hypothesis science cannot apply its methods to the mystical or spiritual. We must apply science to everything that its methods will grip. Thus there is a science of æsthetics, of dreams, of ideals, even of religions. Similarly to the whole universe, broad and deep and high—including science itself—there is applicable the religious interpretation that it expresses part of a Divine idea, imagination, or purpose. The whole ocean is open to scientific and to religious inquiry ; but the aims of the two inquiries are different.

To our view—that there should be no radical antithesis between science and religion—a third objection is that this is like asking the combatants in a protracted war to recognise that it has all been a misunderstanding. But our thesis is not that there is *no* conflict, but that it should not be radical. The religious doctrine of creation implies the belief that the institution of the Order of Nature expressed a Divine Purpose or Idea ; it is not inconsistent with this to hold also to the scientific view that the mode of the Becoming has been evolutionary. The two views are complementary, not antithetic : the one is interpretative, the other descriptive.

But some measure of struggle and controversy must and should arise when the expression of the religious conviction jars with the expression of the scientific conclusion.

For in the inexact sciences especially, the expression of the scientific conclusion—say the biological view of man—is often shot through with implications which are not scientifically warranted. Fundamentalism was in part a justifiable recoil from crudely expressed evolutionism, and similarly many scientific inquirers have justifiably recoiled from hopeless anachronisms in religious interpretation.

The history of intellectual development shows that science has repeatedly made certain a new view of the world and of man, and that after a period of struggle this has been followed by some adaptive change in the concept of God. Thus the scientific demonstration of what we may continue to call the 'Reign of Law' made it impossible for thoughtful men to think of a God who was always interfering with his Cosmos. Pope finished with that view in the irony of his familiar line : ' Shall gravitation cease when *you* go by ? ' Similarly, when Darwin made it quite clear that the origin of adaptations could be scientifically accounted for, it became impossible for thoughtful men to speak any longer of God as the Divine Artificer. But in both these cases, the result of controversy was refinement of the idea of God.

In most cases controversy arises and should arise when there is *trespass*, when the religious mind insists on being descriptive, or when the scientific mind insists on being interpretative. Thus, if science, unconsciously or ignorantly, incorporates some piece of bad metaphysics, and insists on an exclusively materialistic or even an exclusively behaviourist description of man, religion must rebel—not to speak of common sense. On the other hand, when a certain Bishop Lightfoot (not the other one), writing in 1618, declared that man was created by the

Trinity about 4004 B.C. and about nine o'clock in the morning, he was gratuitously asking for trouble, trespassing on the descriptive province of the anthropologist. Similarly, from the pulpit to-day we have heard statements made in regard to the resurrection of the body, which could not but be outrageous in the ears of any student of chemistry and physics. Yet we are quite prepared to hear that there is an esoteric religious truth within the out-of-date expression-husk in which the doctrine in question is enclosed.

Much controversy is due to trespass and might be avoided ; but the subtler controversies are due to the difficulty of reconciling somewhat out-of-date religious expressions with somewhat premature scientific pronouncements, or vice versa.

In thinking of science and religion, two of the noblest expressions of the evolving spirit of man, we must not allow ourselves to be too much preoccupied with their conflicts, we should think also of their mutual stimulus. How has science helped religion and how may it continue to be of service ? Science is continually giving man a new world, and every great discoverer—Copernicus, Newton, Darwin, Einstein—is a Columbus. To each successive new world it is for philosophy and religion to adjust man's outlook, and though the transitions are often painful, the result in the long run is bound to be progressive ; for Evolution as a whole is integrative, and so it must be with the development of our world-outlook.

Our new world excels that of our forefathers in its grandeur, its orderliness, its beauty, its revelation of advance or progress, its disclosure of the growing emancipation of mind in animal evolution, in its strange organic

anticipations of human ideals, in its deep awesomeness, and in its *suggestions* that Nature is Nature for a purpose. Here we partly mean that, just as we have become accustomed scientifically to see Man in the light of evolution, so philosophically we must try to see evolution in the light of Man—the whole process in the light of its present climax. We say climax since the evolutionist does not like to speak of ending, there being no warrant for supposing that the age-long advance is about to stop.

The religious mind must not be disappointed because the naturalist no longer argues from Nature to Nature's God ; for that is not his aim, and it would in any case be a conclusion much too big for the premisses—the fallacy of transcendent inference. But what we should be grateful for is that the naturalist has made it easier for the religious mood to breathe in the scientific world to-day than in that of our forefathers. Caprice has disappeared from the world ; the fortuitous has shrivelled ; it is an ascent not a descent that man has behind him ; the momentum of Nature, embodied in flesh and blood, is much more on the side of the angels than was previously supposed, and it is with us at our best. Highest of all, the creationist's concept of the Supreme Reality has given place to the evolutionist's finer, though vaguer, vision. Jehovah's name has been changed from ' I am that I am ' to ' I will be what I will be '. While it is not the business of science to search after God, as Mr Langdon-Davies has mistakenly maintained in his brilliant book, *Man and His Universe*, we deliberately say that one of the great services of science to Man has been to lead him to a nobler view of God. In a very literal sense science has given man a new heaven and a new earth, and in this he

continues to strain at the limit of his intellectual effort and often finds no peace except that which literally passeth understanding—a belief in God.

And not only has science given us a new world, it has given us a new man—a venerable antiquity and yet a newcomer ; a repository of an inconceivably long past and yet a mutant still ; a more intelligible being than he was to our grandparents and yet, in other ways, as the Greek poet said, the crowning wonder of the world. Sound science has done something to save us from an easygoing view of ourselves ; but we must continue to see to it that our picture portrays man whole, omitting neither his pedigree and Primary Unconscious on the one hand, nor his high achievements and still higher aspirations on the other. Science warrants us in thinking nobly of Man, and many feel the need of a correspondingly noble religious interpretation. And we must not slur over the fact that among the data that lead us to religious feelings and beliefs when scientific formulæ stop short, is just Science itself - this eerie measurement of creation by one of its creatures. To some of us it is impossible to make sense of the fact of science save as a distant echo of the Divine Creator. In any case, if we are aiming at some resoluteness in our thinking, we must not simply take science for granted. Science has gradually grown from humble beginnings ; it has become an august system of knowledge, and a light on man's path ; it is in many ways astounding (what Aristotle called ' thaumaston '), and it seems to many to demand some interpretation, especially if we accept the Aristotelian doctrine that there is nothing in the end which was not also in kind in the beginning.

At the present climax of Science there is Reason triumphant ; what then in the beginning ? Here our straining

at the limit of our intellectual endeavour brings us back perhaps to the wisdom of the old words :

In the beginning was Mind,
and that Mind was with God,
and the Mind was God.
All things were made by it ;
and without it was not anything made that was made.
In it was life
and the life was the light of men.

Instead, then, of always thinking of the conflict between science and religion, with faults on both sides, we should also consider how science may be of service to religion, that is if we believe in the legitimacy of religion at all. Many men and women become religious traditionally, but if the initiative is their own, it is usually because they have reached some strain-limit—whether that be along practical, emotional, or intellectual lines. But we must not think of religious activities as mere attempts to eke out the normal by appeals to the mystical ; they are that, but they are more, else too pathetically like tendrils clinging to tendrils. They have their reward, we believe, by bringing the religious suppliant, or worshipper, or faith-adventurer, into closer touch with the Supreme Reality. Religion would not have survived so long if the religious had not received *some* reward, which, at various times, they have called ‘ life ’, ‘ salvation ’, ‘ grace ’ or ‘ truth ’. The evolving idea of God is man’s largest thought, and what may it not mean for a man ? But behind the idea there is the Supreme Reality itself, never far from any one of us. Even a glimpse of the Vision of God may be an enrichment of life.

Finally, I wish simply to raise the very unorthodox question : May science be helped by religion ? Most of

my scientific colleagues would answer with a thunderingly emphatic negative. For science follows the arduous path of accurate experiment and precise formulation; it analyses, measures, registers, and sums up, and all without being influenced in statement or methods by any hope or any fear. When at work, science keeps emotion at a spear's length; its emblem might be the light of the glow-worm, all light without any heat-rays. It will be an evil day when science at work stops to dance to any piping of poetry, philosophy, or religion. But let us beware of compartmental minds! Do not let us be too sure that science has nothing to learn from religion. That seems very unlikely on the face of it, for both are concerned with the enlightenment or enrichment of life in evolution. No doubt science aims primarily at understanding, being, as Bacon said, 'luminiferous' rather than 'fructiferous'. Yet science is for life, not life for science, and it is continually being applied by man to practical problems—more so than ever to-day. But until recently, poetry, art and religion have always been far ahead of science in their intuition of ideals, with which, indeed, science as science is not directly concerned. Hence some possible value to science. Though science is impersonal and unemotional in its method of working, it sets itself to tackle practical problems in the light of sure knowledge. As Bacon said, it is not solely for the glory of the Creator, it is also for the relief of man's estate. It seeks primarily for understanding, but it also seeks, less directly no doubt, to remove evils and increase good. Now it is plain that religion must have to most of the evils of life, though not to ignorance, a more sensitive conscience than is possible to science. In this way, as spur and as reins, religion may help science towards the amelioration of life.

Take another instance : It is part of the ambition of the socialised biologist to understand human life, so as to help man to make the most of each stage in its trajectory from childhood to senescence. Now, as Professor Patrick Geddes has pointed out in scholarly detail, there is in Greek mythology—in Olympus and Parnassus alike—a great wealth of suggestion for psycho-biological and bio-psychological research and endeavour, sometimes along lines which are full of promise for eugenist and hygienist, educationist, moralist and more. Thus it seems vastly improbable that biology will not be illumined by a study of the Greek gods and goddesses, who were so largely idealisations of the various phases of human life, and by a study not of Olympus only, but of the muses and the furies too. Religion to the aid of biology !

To sum up our view. Much of the conflict between science and religion is the outcome of misunderstanding, of failing to distinguish empirical description and transcendental interpretation—the lowest common denominator from the greatest common measure. But much of the controversy is necessary and to the good of both sides ; for it tends to the sublimation of religious ideas, and it tends to keep science conscious of its limitations. What we are surest about is that we need *more* science and *more* religion—ever so much more.

III

PROFESSOR J. S. HALDANE, C.H., F.R.S.

I WISH to speak, not to those who are more or less satisfied with religious beliefs in which they have been brought up, but to those who feel that in view of the advances in science these beliefs must either be abandoned or greatly modified, as their traditional form is inconsistent with existing knowledge.

Let me first refer to the mechanistic or so-called materialistic interpretation of our experience. This mode of interpretation is systematised in the physical sciences, but traditional religious beliefs are also permeated with it. Mechanistic interpretation seems to correspond with experience, and to be at any time verifiable within wide limits by experiment. It is also of enormous practical importance, and quite indispensable, in the guidance of our conduct. If, however, we attempt to make mechanistic interpretation the sole basis of our philosophy of life, we must abandon completely our traditional religious beliefs and many other ordinary beliefs. Hence we find almost everywhere some sort of compromise, in which mechanistic interpretation exists uneasily, side by side with very different interpretation. The mechanistic and non-mechanistic sorts of interpretation are, however, ultimately inconsistent with one another; and the growing clearness with which this has come to be realised in modern times has created the present confused position as regards religious and other beliefs.

It was particularly in connection with the study of physiology that I myself came to realise this; and I think

that what seems to me the way out in connection with physiology points towards the real way out in connection with religion. The systematic physical standpoint implies that what we call the phenomena of life must in ultimate analysis be capable of interpretation in terms of physical and chemical principles. This conclusion was actually accepted by the great majority of biologists in the latter part of last century—for instance by Huxley ; and it is still accepted by many biologists, though usually with substantial reservations. In the first lecture of this series it is fully accepted by Professor Julian Huxley.

Now it seems to me that when we regard biological phenomena from a purely scientific standpoint it is quite impossible to accept the mechanistic interpretation, and for the following reasons. The characteristic feature of the phenomena of life is that these phenomena, whether of structure or activity, tend, in the case of any particular species of organism, to persist and reproduce themselves as a whole. When, moreover, we examine the details of structure, environment, and activity, we find that they are so co-ordinated or connected together that as a net outcome the life of the organism or its kind tends to be maintained. The life-conserving co-ordination appears as of the essence of life. We never succeed in seeing beyond it. At any moment the environment seems to be determining the phenomena within the body of an organism ; but this is only a half-truth, since the influence of environment on an organism is also determined with reference to the other phenomena, both of structure and activity, in the life of the organism, in such a manner that its life as a whole, or that of its kind, tends to be maintained. The co-ordinated maintenance or wholeness is always there : we cannot, in our observations of life,

separate organism from environment, or structure from its activity, since the moment we attempt to do so we are neglecting the co-ordinated maintenance which is always present. In what we interpret as a mechanical system we may have mutual determination or co-ordination of parts, but not persistent maintenance and reproduction. This distinguishes life from any mechanically interpreted system, however delicate and complex it may be ; and from the physical standpoint life is nothing less than a standing miracle. Neither the physical conception of causation or mutual determination, nor the mathematical conception of mutual externality, fits our experience of life.

There is no limit to the experimental investigation of the phenomena of life ; but what the investigation reveals more and more fully is the detail of the wholes which we call lives. Phenomena which can be separated in observation from the other phenomena of a life, as definite links in a causal chain, or network of links, are never revealed. The progress of biology is just the progressive discovery of the nature of lives as such, and never the discovery of what can be more than very imperfectly interpreted as physico-chemical mechanism.

It was formerly supposed very generally by those who believed in the possibility of a mechanistic interpretation of life that the process of natural selection accounts for the characteristic features of life as contrasted with what we ordinarily interpret as physico-chemical mechanism. But this supposition breaks down at once as soon as we reflect that the whole theory of natural selection is based on the fact of hereditary transmission, which itself implies the distinguishing feature of life as co-ordinated unity always tending to maintain and reproduce itself. This

applies also to the variations which are an essential feature in the theory of natural selection. Thus natural selection affords no help whatever to a mechanistic interpretation of life. We never trace life back towards mere mechanism ; and if we assume that life is not inherent in Nature, and that there must have been a time before life existed, this is an unwarranted assumption which would make the appearance of life totally unintelligible.

It has also been supposed that it is only because of the extreme complexity of the physico-chemical processes of life that we have hitherto met with so little success in analysing life into physico-chemical mechanism. Coupled with this supposition is the confident assertion that by the application of physical and chemical methods to the phenomena of life we are making gradual progress towards a physical and chemical interpretation of life. In the development of physiology, in either recent or former times, I can, however, find no trace of progress in this direction ; and I speak as one who has been for very many years engaged actively in physiological research, particularly with the help of chemical methods. By experimental investigation we are constantly adding to our knowledge of life. But what we are finding in this way is more and more of what is characteristic of life—not what we can interpret as mechanism, unless indeed we deliberately leave out of account the staring facts which stamp the features of life on the phenomena. This leaving out of account is, as it seems to me, simply bad physiology. Biology as a coherent body of knowledge is always seeking for and finding the co-ordinated maintenance which is characteristic of life.

What, then, is the relation of biology to the physical sciences ? To my mind the relation is simply this, that

physical interpretation supplies only a preliminary imperfect outline of what we observe. When we compare this outline with actual experience, as met with in the phenomena of life, we find that behind the outline there is persistent co-ordination which is not represented in it, and which physical interpretation, or mathematical formulation of this interpretation, cannot express, since it assumes a universe of separable units and events. For biological interpretation the apparent separability has disappeared. In biological interpretation the principle of what General Smuts has called 'holism' is essential.

The attitude of biology towards the physical sciences is by no means a hostile one. That attitude is that where we do not see any further into our experience than physical science is capable of interpreting, we are right to seek for preliminary physical and chemical interpretation; and all biological advance is based on preliminary physical and chemical interpretation. But where we do see farther, as when we perceive the co-ordinated maintenance which is characteristic of life, we must adopt appropriate interpretation, and can do nothing less than make use of the distinctive conception of life, applied not merely to organisms, but to their environments as well, so that nothing is left outside of the conception. Biological explanation is just the demonstration that what we call structure, material, or activity is taking part in the maintenance of the life of an organism or species. In virtue of this demonstration biology reaches exactitude in the same sense as do other branches of knowledge.

This conclusion is not that known historically as vitalism, but is far more thoroughgoing. The vitalists assumed that within living organisms a special influence is operative which imposes on ordinary matter and energy

the co-ordination which is so evident in what is living. In virtue of this influence, or 'vital principle', the parts of a living organism appear as, to use the old expression, determined by the whole. The fatal objection to this conception is that we can easily show experimentally that the behaviour of an organism, however characteristic, is dependent on conditions in the environment. If, as the vitalists admitted, the environment is nothing but a physical and chemical environment, we are thus compelled to make the futile admission that life must be physically and chemically determined. The position of the vitalists was a hopeless one, and was abandoned by biologists for the best of reasons. The environment is in reality not outside the wholeness of life but included in it; and it is meaningless to discuss the relation of what is living to its physical environment, or to speak of 'living matter' or 'the physical basis of life'.

If, for instance, we attempt to trace from a purely chemical standpoint the behaviour of what appear as molecules or atoms entering the vortex of living protoplasm we find that the attempt is vain, because the behaviour of the assumed molecules or atoms depends on their relation to all the other phenomena which express the maintenance of the organism's life. We can describe the phenomena as phenomena of life, but we cannot describe them as changes undergone in what we interpret as individual molecules or atoms. The distinction of the biological from the physical standpoint is a logical one, affecting fundamentally our mode of interpreting and describing our experience; and for biology physical interpretation is only partial and imperfect interpretation.

The recent developments of physical interpretation

by Einstein have shown that in place of the old conception of matter from which attractive or repulsive forces emanate we must substitute the conception that matter is the centre of a persistent corrugation in a space-time continuum. But when we substitute this new conception the impossibility of a physical interpretation of life remains just as it was. Life cannot be pieced together out of separable events. .

Biology is thus an independent science, not part of physics and chemistry, but moving on a higher plane than they do—higher because biological interpretation is a truer representation of the reality which appears to us in our experience. The laws of physics and chemistry are, for biology, imperfect descriptions of experience, since they do not take essential facts into account ; and if it be assumed that physical description is perfect description, the attitude of biology towards this assumption can only be one of emphatic denial, based on actual visual and tactile experience. If we seek to reach fundamental interpretation of that experience we cannot ignore life, though we do so for practical purposes in the physical sciences.

It has often been assumed that before we discuss life, or indeed before we discuss philosophy, we must ascertain the physical and chemical facts. This way leads nowhere, since it is the physical and chemical ' facts ' themselves that are in question. Neither biology nor philosophy can afford to cringe before the physically interpreted or mathematically formulated universe.

Biology has nothing directly to do with religion, and by no possibility can religion, such as we know, be based on biology ; but the fact that biology bars decisively the door against a final mechanistic or mathematical

interpretation of our experience is at least very significant in connection with our ideas as to religion.

I must now turn to our experience of conscious behaviour. Here we reach a different region of interpretation from that of either the physical sciences or biology ; but the relations of conscious behaviour to life are analogous to those of life to mechanism. What distinguishes our conception of conscious behaviour from that of mere life is the fact that conscious behaviour, which includes both perception and voluntary responses to it, implies both retrospect and foresight in the maintenance of what we now call, not mere life, but interest and values. In biology we interpret life as blindly maintained unity, into which neither retrospect nor foresight can be distinguished as entering. In what we may comprehensively call psychology, which includes all the great and far-reaching branches of so-called humanistic knowledge which deal with conscious behaviour, the evident presence of both foresight and retrospect distinguishes the maintenance of interest and values from the mere maintenance of life. For psychological interpretation the present is no mere fleeting moment : it holds within it both the past and the future, so that spatial cannot be separated from temporal order, as, indeed, is now recognised in physics through the principle of relativity. When we perceive something, we perceive it, not merely as a fleeting impression among other fleeting impressions, but as essentially related to past, present, and future experience, as was pointed out by Kant. We also perceive it, though this was not realised by Kant, as a dynamic element in the interest which sums up the nature of conscious behaviour and so constitutes personality. Exactly the same considerations apply to conscious actions, which are

nothing but perceptions in their dynamic aspect. It is just in virtue of our perceptions and actions being of interest to us that they enter into conscious behaviour.

This interest does not merely endure throughout change as we conceive matter or energy or life enduring, but in change itself the progressive manifestation of interest is expressed. The present conscious experience can only be described with reference to the enduring and developing interest expressed in it and constituting personality. It is only so that we can describe conscious experience; and if we attempt to describe it as we describe what we interpret as physical or biological phenomena, the attempt is a gross failure.

Advance in psychological interpretation may be said to be based on biological interpretation in the same sense as advance in biological is based on physical interpretation. What, for instance, are for biological interpretation stimuli such as those of hunger, thirst, sexual or parental or herd impulses, acting as blind expressions of life, become for psychological interpretation the expressions of personality, and thus assume a deeper and truer meaning. To neglect this meaning is simply bad psychology, such as is still rampant at the present time.

All that we know or have experience of comes to us as conscious experience. It covers all that has any meaning to us, including the experience which we imperfectly interpret physically and biologically. Nothing is left outside it, though we are constantly failing to realise this fact. Thus psychological interpretation constitutes a higher plane of interpretation, nearer to reality than mere physical or biological interpretation. In the latter the fact of all experience being perceived and an expression of interest is left out of account.

Personality does not imply a soul existing independently of, and side by side with, a material body and physical environment. The conception of personality extends not only over the body and environment but also over their history ; and apart from the body and environment, both spatial and temporal, in which personality is expressed, it means nothing. It has been said that we cannot know the external world as we know our own sensations. This is only an echo of the mistaken psychology which regards our environment as outside ourselves in space and time, in the same sense as one unit in the physically interpreted world is regarded as outside any other unit. Space and time do not isolate personality : they express an order within it, so that the immensities of space and time are within it, as Kant saw. When we consider that our experience is conscious behaviour we must discard the physical conception, which is simply not in accordance with experience. On whatever plane of knowledge we may be moving, it is by our actual experience that we test and verify this knowledge.

Let us now examine conscious experience or personality further. So far as we have gone, conscious experience has been treated as if it were only individual conscious experience, surveyed, however, as it might appear to a psychologist to whom impartial observation of different personalities was open from a high scientific standpoint, just as a biologist surveys the lives of different organisms. Any observer would, however, be apparently himself nothing more than one observer among others, with his own particular interest.

But is it so ? When we look more closely we find that interest is far more than mere individual interest. Within our personalities we experience an active ideal of truth

which is in no way a mere embodiment of individual interest, but embraces all individual interest, and of right and charitable conduct which embraces other individual interests, and is far more than what is in individual interest. We also perceive beauty which is no mere expression of individual taste. Thus personalities do not exclude one another. It is simply a fundamental fact in our experience that an active ideal of truth, justice, charity, and beauty is always present to us, and is our interest, but not our mere individual interest. The ideal is, moreover, one ideal, though it has different aspects. The whole of civilisation depends on the presence of this ideal ; and there is no limit of any kind to its activity. Thus personality is not merely individual.

It is in this fact that we recognise the presence of God—God present not merely as a being outside us, but within and around us as Personality of personalities. The evidence of God's existence is the presence within us of personality above that of our mere individual selves ; and it seems to me that there is no other evidence which has any weight at all. What is often called revealed religion has no other real basis. I feel that I must be perfectly frank here. The apparent historical evidence of revelation from without seems to me worthless, as does any evidence supposed to be furnished by natural science. It is only within ourselves, in our active ideals of truth, right, charity, and beauty, and consequent fellowship with others, that we find the revelation of God. But that revelation is abundantly sufficient and absolutely conclusive. As Professor Malinowski points out, religion is present in even the crudest civilisation.

The existence of God as Personality of personalities sums up for us the ultimate nature of the universe of our

experience. In ultimate analysis that universe, with its spatio-temporal order, can be nothing less than the progressive manifestation of God—a manifestation which is constantly active or creative, and therefore, in the order of time, at any moment incomplete. It is God's existence that imparts objective reality to what appears to us imperfectly as a physical, biological, or psychological world.

Let us retrace the steps in the argument. We have become accustomed to the picture presented by physical science of ourselves and even our planet as mere evanescent specks in a universe which is boundless in space and time, and in which, though we sweep the heavens with our telescopes and spectroscopes, we seem to find no trace of a personal God. As part of this picture we can also look back to a time before life and personality, such as we know it on our insignificant planet, could have been possible under the existing conditions.¹

¹ In his Rede Lecture, *The Mysterious Universe*, delivered at Cambridge in November 1930, and afterwards published, Professor Sir James Jeans has presented the physical picture in an extremely clear and scholarly form, in accordance with the most recent advances in physical theory, and indicating what are at present gaps in the picture. In this picture, however, there is a complete disregard of the significance of both biological and psychological experience. As a consequence, the 'universe' depicted is not that of our experience. In the Preface he says that 'before the philosophers have a right to speak, science ought first to be asked to tell all she can as to ascertained facts, and provisional hypotheses. Then and then only, may discussion legitimately pass into the realms of philosophy'. This is a claim which cannot be admitted by philosophers. Nor can biologists or psychologists admit the implied claim that science is just physical

But there is a *previous* question which philosophers have asked with regard to this picture ; and biologists can ask a similar question. The question is whether the picture is anything more than an idealised and very imperfect representation of reality. The apparent physical world is, for one thing, only known to us in perception and interpretation of perception. Is the mere physical picture consistent with its being a perceived picture ? It is evident that what I have already said answers this question with a decided negative. •

It has been claimed for mathematics and mathematical physics that, as compared with other branches of knowledge, they can be distinguished as being exact. In reality their exactitude applies only to an idealised world, in the constructive interpretation of which simplifying assumptions which are inconsistent with other aspects of our experience have been made for practical purposes. This simplification ultimately converts the picture into an incoherent nightmare ; and the modern world has gradually become more and more oppressed by this nightmare ever since physical interpretation took systematic shape.

One part of the physical picture is a mechanistic picture of life. I examined this picture, and pointed out that it is not only inconsistent with our scientific knowledge, but that such knowledge presents us with a revised biological picture of the whole of what we are accustomed to call the physical world. Since the atomic theory and dynamical theory of the states of matter were introduced into physics, it has also gradually become more and more evident,

or mathematical science. I seem to detect a similar inadmissible claim in Sir Arthur S. Eddington's able contribution to this series, much as I agree with him.

particularly in the last few years, that even if we neglect what we ordinarily recognise as the phenomena of life and conscious behaviour, the physical picture of reality is only a statistical outline, and that behind that outline is a world which the physical picture cannot represent, and which has characters reminding us of the biological picture. The biological picture, which, as the expression of wider study, represents the existence of inherent co-ordinated maintenance, is far less inadequate, and constitutes a very definite step towards adequacy. The psychological picture, in which, as the expression of still wider study, inherent maintained co-ordination of successive as well as simultaneous events is represented as personality, constitutes a still further step. All our mathematical, physical, and biological science is based on conscious experience, and thus implies personality, of which the scientific ideas are mere practical tools.

The presence within pictured individual personality of an active ideal of truth, justice, charity, and beauty, brings us to the final step, whereby the picture of our universe becomes nothing less than that of the manifestation of God as the Person of persons. The final picture is thus of God as the only reality, eternally present, and eternally creative. In his contribution to this series Professor Alexander argues that life, personality, and God have 'emerged' from the physically interpreted universe. Apart from what seems to me the complete obscurity of the conception of such emergence, he starts from an unperceived universe, which *ipso facto* is not the universe of our experience.

It may be pointed out that this picture is pantheistic, leaving no place for individual freedom or individual immortality. In one sense this is true. But since the

picture identifies man's reality with God, the supreme person, both freedom and immortality remain : it is only individual freedom and immortality that have disappeared, since, like the pictured physical world, they imply what is unreal. This is the solution of the old theological puzzle over free will and the supremacy of God.

Like the physically interpreted world, individual personality, evil, and death may appear to us as if they were stern realities. From the standpoint of religion they are so no longer, and it seems to me that one who seeks for individual immortality or individual reward of any kind, has to this extent lost sight of the vision of God. Were the whole human race to be blotted out, God would still, as from all eternity, be the only reality, and in His existence what is real in us would continue to live.

It appears to me that the true standpoint of religion and the final standpoint of philosophy, and therefore of science also, are identical in the sense that they imply the personality of God within and all around us. The ideal of truth and right is present no less to one who with singleness of aim pursues scientific investigation than to one who pursues in a similar spirit the duties before him in any other occupation, whatever it may be. It is the single-minded pursuit of what appears to be right, charitable, true, and beautiful that is significant. But religion and philosophy put heart and courage into this pursuit by pointing towards its underlying reality, and so enabling us to face with a stout heart every apparent ill. They give us a sense of fellowship with man, beasts, and everything past, present and future, in Nature around us. They also enable us to face, without fear or despair, the deaths of those dearest to us, as well as our own inevitable deaths.

A materialistic or agnostic outlook tends to leave us without this courage, and to tempt us to grasp only at unreal shadows of the passing moment, such as useless luxury. These can never constitute a satisfying standard of self-fulfilment. The real standard of the poor may be far more satisfying than that of the rich ; and we are constantly seeing this around us. The reason is that God is within us, and our very selves, so that only by directing our conduct in accordance with what appears to us as right and true, or the will of God as revealed in us, can we fulfil our real selves.

The faith that all things are in the hands of God, and that, as Jesus taught, God is present in us, so that we can be one with Him, gives us the peace of mind and courage of which we are always so much in need. Religion is of faith, and emphatically not of sight, because God's creative manifestation is never completed ; but faith rooted in the very nature of our experience is sufficient for us. With that faith goes deep individual humility and far-reaching charity. It is only a little, and in a blurred manner, that we can see of our universe ; but that little is enough.

Scientific study helps us to distinguish religion from its effete theological trappings, and purge theology of materialism. It is with great satisfaction that I watch these trappings dropping away, one by one, since they repel multitudes of educated men and women from religious fellowship in its ordinary sense. As regards, however, the future of Science and Religion, I feel confident that they will come to walk hand in hand to an even greater extent than they ever did in the past. Science is a search for truth, hallowed by the presence of God in the searching ; and scientifically interpreted truth is the

best that can be reached from the imperfect data under immediate consideration. But philosophy is also needed to keep the imperfection of the data in view, so that science without philosophy is apt to be very misleading ; and the same applies to theology. What makes confusion at present is the mistaking, by representatives of both Science and Religion, of imperfectly seen and interpreted reality for full reality. As to the nature of that reality there is, however, as it seems to me, no room for any sort of compromise. The only ultimate reality is the spiritual or personal reality which we denote by the existence of God.

IV

THE RT REV E. W. BARNES, F.R.S.

Bishop of Birmingham

THERE are times when, after a spell of burdensome ecclesiastical routine or pitiable controversy, I stand aside in thought and try to see the meaning of it all. What is the use of religion? Why has it such vitality? Why can it with such ease be joined to bitterness and superstition? Would not the world be better without it?

And then I begin to reflect what religion has given to me myself. Like other boys and girls, as I grew from childhood I found myself a lonely thing with dreams and fears and joys and, above all, perplexities. I began to see what a tragic business human life often is. For many—perhaps for most men and women—opportunities are painfully few: their powers have no chance of finding expression: a narrow round cramps their growth. For all of us life is absurdly brief. Our Universe seems to be millions of millions of years old; yet man counts himself fortunate with four-score years. To the future duration of our Universe none can place limits: the earth will probably support life for hundreds of millions of years at least. Thus we are, as it were, shut in between unfathomable immensities. Further, though life's joys be many, so are its ills. Pain and disease are the never-silent heralds of death. We are often shocked by Nature's ruthlessness; and the more sensitive we become to beauty and goodness, the more do we recoil from the moral ugliness and brutality which seem to pervade that animal kingdom to which we belong. So the question

arises as to whether all that is best in us is a useless and inexplicable by-product of some soulless factory. Are we, Nature's offspring, bound, so far as we are true to our highest emotions, to fight against Nature—and, fighting, to be swept into oblivion? To earthly oblivion our race is doomed. We shall pass away like the many extinct creatures that in turn have lorded it over the land where it is our fate to live and die. Will the spirit within us likewise perish, or—and here faith raises its head—is there perchance a spiritual realm which is our true and eternal home? Such musings are common to us all when we draw apart from life's hurly-burly and think of its meaning. They leave us hopeless or reckless, with at best a sort of proud despair, unless some form of religious faith transforms our outlook.

Now the faith which constitutes the essence of the finer types of religion has been described as 'a moral trust in Reality'. It is the assurance that whatever is at the heart of things is not hostile to our highest aims and ideals. The Universe, in other words, is friendly. The spiritual aims and achievements of man are not an inexplicable outgrowth of some moral barbarism which we must take to be the true character of the Source of existence: on the contrary, man's highest aims and achievements belong to the essentially spiritual nature of That in which all creation takes its origin. We strive for truth: truth is at the heart of the Universe. We seek beauty, and would make righteousness prevail among men; beauty, also, and goodness are at the heart of the Universe. We long for peace: with the Source of all power there is perfect peace. We thus see why religion has been defined as fellowship with the Unseen. True religious faith is a certainty, deep and strong, that we were not made for nought, that we need

not fear the immensities which shut us in, and that all that is best and highest in man shall not perish because it reveals the hidden glory of God.

There are, of course, many who say that such a faith is, no doubt, beautiful and inspiring ; it is also useful as an anodyne to anxiety or as an opiate for suffering. But is it true ? Science, they remind us, is the body of knowledge won by patient and orderly investigation of the working of the Universe. Is such knowledge compatible with religious faith ?

It is at this point that there arises the possibility of conflict between religion and science.

Now, before I speak of such possibility of conflict, I wish to make it quite clear that many beliefs, associated with religious faith in the past, must be abandoned. They have had to meet the direct challenge of science : and I believe it is true to say that, in every such direct battle since the Renaissance, science has been the victor.

Let me give definite instances.

First, the earth is not the fixed centre of the Universe ; it is merely the moving satellite of a sun which resembles innumerable other suns. Secondly, man was not specially created, but has evolved from an ape-like stock. Thirdly, no priest, by ritual or formula, can attach spiritual properties to inanimate matter. Living men have spiritual value ; dead matter in itself is spiritually valueless. Fourthly, if by miracles we mean large-scale breaches in the uniformity of nature, such miracles do not occur in human experience. Here are four typical results of scientific investigation which at length all must accept. The period of indecision is past and gone ; nowadays, fundamentalists and magic-mongers alike merely do harm to true religion. Thus, science is gradually stripping

myth and magic from religion. But the essence of religious faith, as I have described it, need that be abandoned ? Can science prove that the Ground of the creative process of which we are products is indifferent to goodness or truth ? Does it even make the fact appear probable ? I think not.

Now, first of all, science is not directly concerned with origins ; it is therefore silent, or should be silent, as regards Divine causation or, in simpler language, as to how God causes events. Science examines the ways in which things happen ; and, in so doing, it takes the sequences of Nature for granted ; they are given facts of which no ultimate explanation can be discovered. Science, however, rests upon faith, for it assumes that man can reach some measure of truth. Yet ultimate truth is beyond the reach of science ; no one can prove that our scientific concepts correspond to the actual nature of things. Further, science has remarkably little to say as to the scale of values by which we order our lives. Yet such values are fundamental to religion. These certain facts suffice to show that the conflict between science and true religion is not direct. What exists is a conflict between such a religious faith as I have set forward and the philosophical conclusions which some men of science derive from their studies.

Now, I, personally, believe that the Creator and Lord of the Universe is God, as Christ revealed Him. In Him are beauty and truth : He is the source of righteousness and peace. His kingdom is the realm where all these qualities exist in perfection. Further, I hold that, as Christ taught, man was created that, by struggle and service to God, he might enter the Kingdom of Heaven. But there are distinguished men of science who have

reached very different conclusions. Though I differ from them, I would speak of them with the respect due to men who seek truth. They believe that the Universe is, in essence, non-moral. Out of the blind forces of Nature evolutionary development has emerged. Man with his moral sensibility is thus at war with the cosmic process of which he is the product. He must fight lest he lose his moral self-respect ; but he can have no fellowship with the unseen ; and, moreover, in the battle he will really fight in vain, for extinction, absolute and complete, awaits him.

Now, as I criticise this standpoint, I would ask you first to notice what is implied by the belief, fundamental in scientific method, that man can attain some measure of truth. If this belief is well-grounded, man must be so constituted that there is a harmony between his ways of thought and Nature's laws. Unless we are right in such a belief, no science can be possible. Yet the belief implies that there is a rationality in the Universe akin to the rational thought of man. Reflection upon such a fact, to say the least, makes us doubt whether the cosmic process is not directed by mind.

Such doubts, moreover, increase when one considers the past history and development of the earth as various sciences now unite to describe it. There has obviously, in this vast panorama, been a progress which has culminated in the creation of civilised man. Is that progress the outcome of blind forces ? It seems to me fantastic to say ' yes ' in answer to this question. Without some directing intelligence, chaos would remain chaos. The process which has led to man from the dead matter of a cooling fragment of the sun is surely evidence both of progress and also of purpose. In fact, the natural

conclusion to draw from the modern knowledge won by scientific method is that the Universe is subject to the sway of thought—of thought directed by will towards definite ends. Man's creation was thus not a quite incomprehensible and wholly improbable consequence of the properties of electrons and protons, or, if you prefer so to say, of discontinuities in space-time : it was the result of some Cosmic Purpose. And the ends towards which that Purpose acted must be found in man's distinctive qualities and powers. In fact, man's moral and spiritual capacities, at their highest, show the nature of the Cosmic Purpose which is the source of his being. In this way, by speculation based on purely scientific conclusions, we reach the idea of creation by a God Whose nature is goodness, beauty and truth. By such a mode of argument we are, as I hold, forced to admit that the distinctive excellencies of man at his highest reveal God, so far as knowledge of Him can be attained. Thus it follows that there is some community of nature between the mind of man in general and the Divine Mind. Moreover, if in Christ there was such moral and spiritual excellence as the New Testament asserts, the revelation of God in Him was a true revelation.

I am quite sure that we must reject the notion that matter is self-existent, the primary basis of all that is, and that from its properties the Universe has arisen. For humanity matter is a mental construct ; and what actually corresponds to that construct we do not know, and probably never shall know. The belief that thought is a sort of by-product of material changes that take place in the brain, and that all such changes are part of a vast mechanism, seems to me ludicrous. When the materialist persuasively makes matter produce mind, I admire his skill

as I admire that of a conjurer. But the higher is not produced by the lower. We grant that, in the cosmic process, life and mind have emerged through matter. But such emergence is the result of the creative activity of God Who has thus used matter for His own ends. Moreover, the materialist, who regards thought as a sort of phosphorescence corresponding to material change, of necessity believes that we have no freedom. According to his belief, all the working of our minds is but a consequence of changes according to laws which express the properties of matter. My thought and actions could thus be infallibly predicted by the man who could write down and solve the appropriate differential equations. To this I can only reply that constant and invariable experience convinces me that I have freedom of choice. One of my Cambridge friends years ago put the matter briefly and bluntly when he said, 'I may be a fool, but I'm not an automaton'. In brief, the results reached by scientific investigation, when rightly analysed, give no support to materialism. Matter and its interactions do not constitute the source of all that is : mind is not a product of material change.

But, after rejecting materialism, I have still to meet those who urge that some form of pantheism is the natural interpretation of the knowledge of the Universe won by scientific method. Now there are about as many forms of pantheism as there are pantheistic philosophers. These forms range from the Naturalism which identifies God with Nature, to a belief in Divine Immanence such as I myself hold. We have not, as it seems to me, knowledge which will enable us accurately to specify the range and limits of God's activity. But, if we rightly conclude from our knowledge of evolution that there is purpose in

the Universe, then we must hold that God is *not*, like His Universe, in the making. He must act through matter for ends eternally present to His mind. We may even say that He is immanent in material change, though it is probably much more true to say that matter and all its interactions have their ground in God. But it cannot be true that God is, as it were, diffused mind, which only reaches self-consciousness in man, and in whatever similar or higher beings exist elsewhere in the Universe. Further, all forms of pantheism imply that man is, in some sense and to some extent, Divine. All of them, as it seems to me, must be rejected because, if man is actually a part of God, the evil in man is also in God. Either, then, evil is unreal, or it is in God Himself. In either case, as I think, the foundations of morality are destroyed.

Now, I know that there are some who jeer at the moral seriousness of Christian preachers. But they would resent injustice or cruelty as much as any of us. We cannot, in fact, ignore goodness and truth ; and I believe that it is only when they are ignored or dangerously minimised that pantheism seems a possible creed. Of course, the moral values to which I assign such outstanding importance are not derived from the scientific investigation of the Universe. But they arise from aspects of human experience, which are more fundamental and important than those which can be classed as scientific method. No man of science will ask us to deny the claims of truth, and no humane man will desire that we reject those of goodness. But neither, I believe, can frame a coherent theory of the world save by rejecting both materialism and pantheism. For, of course, any theory which involves a state of war between man and the cosmic process of which he is the product is not coherent. Equally, one

which implies a struggle between good and evil in God Himself must lead to a Universe divided against itself.

According to Christian belief, God, in making man, desired to create free spirits capable of communion with Himself. He could not give actual moral freedom save in a world which contained both good and evil. Thus we can dimly understand why, though God is perfect goodness, there is evil in this world. But we are puzzled that there should be so much evil, and this bewilderment is the chief argument against Christian theism.

Yet, formidable though the objection be, it is to my mind less damaging than the objections that can be raised to atheism or pantheism. Atheism, if true to itself, must end in a pessimism with no guiding principles; pantheism must logically end in a depreciation of the moral law. Ethical theism, the belief that a God of righteousness and truth has created and rules the world, alone takes full account of the fact that moral and spiritual values are of supreme importance in human life. It is also an incentive to right conduct; and, holding the belief, we can rest confident that the Universe is friendly and human life not vain. 'Though He slay me, yet will I trust Him'. 'All things work together for good to them that love God'. In such sentences the eternal optimism of Jewish and Christian theism rings out; and no conclusions of science have successfully challenged, or, so far as I can see, are likely so to challenge the faith on which such optimism rests.

There are, doubtless, some of my hearers who at this conclusion will say, 'But why, then, is religion so often associated with bitterness, fanaticism, and the like?' I think that the cause of such perversions is fear. Those who remember the years of the war will not, especially if

they were pacifists, be in any doubt as to the almost insane fury that fear can produce. Now, to many religious people their faith is their most precious possession. It gives them confidence that the Universe is friendly, that the love of God is a shield and buckler. Such faith, however, they may associate with a whole collection of beliefs of very varying value, true and untrue, grotesque and reasonable. But let one such belief, however childish, be denied, and the whole structure of the faith of these people seems imperilled. Blank fear assails them. A thief is stealing their greatest treasure ; and with violent unreason they denounce him.

It is probably true to say that the religious fanatic is, as a rule, secretly doubtful of the truth of his creed. When a man has reached inward certainty, he is not upset by criticism. Such certainty may, of course, maintain itself because the mind is closed ; and this form is sometimes a not very admirable product of the seminary or of mental inertia. But, at its best, inward certainty results from quiet meditation upon a few fundamental facts : man's origin and nature, his powers, and especially his occasional contact with spiritual reality made, as the Christian would say, sacramentally. I hold that a man can rightly call himself a member of the Christian Church when, as he surveys the pathway to the religious confidence in which he rests, he can say, ' Christ passed along this road ', and add, ' The Master went further than I have gone, yet I will follow Him '. The Christian religion is not an affair of believing this particular creed, or accepting that particular organisation. It can be summed up in a sentence, ' I have found God, and I will try to follow Christ '.

V

PROFESSOR BRONISLAW MALINOWSKI

I AM speaking here about Primitive Religion and Primitive Science and about their relation to one another. I am speaking as an anthropologist, and anthropology, as you know, is the study of man in general and of primitive man or the savage in particular.

The comparative study of religions and of the beginnings of science enters, therefore, within the scope of my speciality as one of its most important subject-matters. And in addressing you here, I feel it my duty not only to pronounce my personal views as to the relation of science to religion, but also to tell you what the science which specialises in the study of this relation has to give as its considered opinion. I shall try to lead you to the very sources of faith in the heart of primitive man. I shall also try to show you the earliest attempts of the human mind to deal with reality, that is the beginnings of science.

Has primitive man a religion? Or is he merely obsessed by savage superstitions, surrounded by the darkness of heathendom? This can be answered categorically: religious beliefs and practices, as well as religious morality, do exist among savages.

Has, then, primitive man also his science? Certainly. He employs his senses and his brains, he observes shrewdly and draws correct conclusions. He thus creates a body of knowledge and a tradition of knowledge—that is, genuine though very simple science.

The most important lesson from this talk will be that religion and science have existed from the very beginning,

and that they have each occupied a different place in human activities. Each has its own task and its own province. It will be our business to define the respective tasks of religion and science.

What is, then, primitive religion? The reader of our classics, of Tylor and of Lord Avebury, of Andrew Lang, of Robertson Smith, or of Frazer will readily answer: Primitive religion consists in Animism, Totemism, Nature-worship, Ancestor-cult, and other similar things. All this sounds very well, and perhaps even very savage, but what is it all in reality?

Animism is the belief in the human soul, and in its survival after death. Hence animism entails a cult of the dead. It also declares that Nature is animated by spiritual beings. Put in plain English, this savage belief is nothing else but faith in immortality and in a spiritual side to the world. There is, then, nothing so very strange or savage in it—in fact a great many of us are animists, all who believe in man's immortal soul, and in its survival after death.

How does primitive animism originate? The older anthropologists would tell you that the savage, pondering on dreams, visions, and cataleptic states, and trying to explain it all, arrives at a theory of the soul. But I should prefer to show you how animism works and what it does for man.

Follow me, then, for a few moments to a small island in the distant South Seas and a few years back in time. A native friend of mine, a Melanesian islander, is on his death-bed; he knows it and so do his nearest relatives and friends. Though mere savages, they are as deeply moved as any one of us would be. Those assembled at the death-bed are united by strong emotions. Fear and

sorrow are unmistakable in the countenance of the dying man and of his friends.

Do they succumb to these emotions? Do they surrender to the horror of death? No! Moved they certainly are, but what controls them is an active purpose. They are carrying out certain traditionally prescribed acts by which they are able to save the dying man; that is, safely to conduct his spirit into the next world and to secure him a happy existence there.

They have covered the dying man with ornaments and flowers; they have put fruit and prepared dishes around him. Their most precious possessions are heaped on his body. All this—or rather its spiritual part—he will take on his journey to the other world. Messages are given him to transmit to those who have gone before. Some of those gathered round the death-bed seem to hear voices from the other world. The dying man is immersed in an atmosphere of affirmation. He is steeped in immortality, in the communion between the two worlds. Those whom he is about to leave take him by the hand, as it were, and lead him across the dividing line. As death approaches, the relatives and friends throng round the dying man, embrace him, rub his body with valuables and sacramental gifts and utter ritual words of comfort. I was forcibly reminded of the sacrament of Extreme Unction and of the Viaticum, as administered in the religion of my youth, in Roman Catholicism.

At last death occurs; the main actor has made his final exit. It is the most terrible and the most sacred moment of all religious experience. The helplessness of man and the hopelessness of the event are ruthlessly driven home to all who witness. Does religion merely express this fear and horror, this sorrow and despair? Is religion

with its gods really made up of fear, as the famous Latin saying, and so many learned theories, would make us believe ?

No. Here again religion orders man to act, and to act constructively. In an outburst of passionate grief, the survivors throw themselves on the corpse, fondle the dead remains, break out in loud wailing. They are seized, as it were, with a frenzy of ritualised sorrow. They tear out their hair ; they gash their bodies ; they rush round, destroying their material possessions.

But all this is ordered, foreseen, determined by tradition. More than that, it is all spiritually significant and morally effective. It helps the survivors, and it helps the spirit of the dead. Religion is never negative ; it never allows man to surrender to fear, to doubt, and to despair. Religious ritual, and the belief which sustains it, transform death from the most shattering experience into one solemn and serious, but never hopeless.

In the customs and manners of burial we find also the same principle : the horror of the corpse and the fear of the dead overcome, the relics sacralised, the terrible conflict of death solved. For there is a curious conflict between the desire to retain the corpse and the desire to get rid of it. In mummification, the body is preserved as far as is possible ; in cremation, it is destroyed completely. In the infinite variety of mixed and intermediate modes, there is a conflict and a dilemma. You love the remains and you express your love ritually by clinging to the relics ; you also loathe them and show this by cutting off all that has touched death from contact with life. Such is the ritual conflict as we find it in Central Australia and in South Europe, in Ancient Egypt or Babylon and in Melanesia.

This ritual conflict expresses something very deep and real. Death must inevitably remain mysterious and create a conflict in the human soul. It is the dreaded end of human life by all earthly measures. It is the transformation of a loved personality into something gruesome and decaying. It changes a benevolent being into a malignant and dangerous ghost. Death, then, either tears all significance out of human life, or else death has to be transformed and to be given an entirely new meaning.

Upon this conflict and chaos breaks the redeeming light of religious truth. It reveals to man that death is not an end ; that the main principle of personality persists ; that it is possible for the survivors to keep in touch with the departed spirit.

Animism, the belief in the immortality of the soul, is not a mere philosophic doctrine ; it is the result of a deep emotional revelation. In animism, religion standardises the comforting, the saving belief, and thus it solves the dilemma of life and death, of survival and decomposition.

At the various ceremonies of death and after, in the ways of disposing of the dead and in the rites of burial, in ceremonies of commemoration and of communion with the dead, above all, perhaps, in ancestor-worship, there is embodied a live faith in the immortality of the soul, the affirmation of the reality of spiritual existence.

The supreme crisis of life—Death—is thus sacralised or sacramentalised throughout humanity. Religion also puts its blessings on other vital crises and capital events of human existence. Birth, puberty, marriage, parenthood, are also made sacred by religious rites and ethical observances. Human existence is thus encased in that wonderful sacramental framework which is one of the main aspects and glories of religion. The main events of human life

are surrounded with feelings of holiness ; they are made public, morally momentous, and spiritually binding. In sacralising the crises of life, primitive religion does not trespass on the preserves of primitive science, any more than Christianity, for instance, in its sacraments of Baptism, Confirmation, Marriage, or Extreme Unction is guilty of usurping the task of the physicist, the chemist, or the historian.

But what about the really savage sides of primitive heathendom ? Take Magic, for instance, or Fetishism. Surely here primitive man shows himself superstitious, as he also does in worshipping animals, plants, or totemic objects. And again, is it possible to have science side by side with all the magical hocus-pocus and with the heathen worship of stick, stone, or beast ?

To answer these questions let us inquire what is primitive man's real concern with his environment ? He has to eat, first and foremost, and the surrounding nature is his living larder. He depends on the surrounding world for his raw material, for fair winds, for the open road, for sun, and for rain. At times, nature turns on him a friendly face ; but then again it becomes unmanageable, dangerous, threatening him with wild animals, poisonous plants, with storms and accidents. And primitive man is much more at the mercy of the unexpected than are we.

Now here the most important thing to realise is that primitive man makes full use of his knowledge wherever he can. You must discard the notion that the savage is a child or a fool, a mystic or a nincompoop. I have seen the savage hunter at work : he knows his animals and their habits ; he is familiar with the properties of his weapons, the strength of his spear and the flight of his boomerang. I have trusted myself to savage sailors on their frail craft

over dangerous seas and under trying conditions. They understand wind and weather, stability and tides, in a truly reliable, that is, in a scientific, way. It is only because he is able to observe correctly and to think clearly that, with his simple tools and limited co-operation, primitive man can master nature as well and as effectively as he actually does.

This, I trust, is convincing—but it is neither obvious nor generally accepted by modern science. Professor Huxley, in his first talk, gave us an admirable summary of the current anthropological views on our subject: yet he did not even mention primitive science. He and most contemporary thinkers would follow Sir James Frazer in identifying early magic with primitive science. Other learned anthropologists go even further and deny that logic, observation, or empirical thought are possible to the savage. He has been made, in fact, by some recent theories, into an incurably superstitious, mystical, even—to use the new-fangled technical term—into a ‘pre-logical’ being. All this is good copy and pleasant reading—it makes us feel really civilised and superior—but it is not true to facts. Science, primitive as much as civilised, is the solid achievement of the human mind, embodied in the tradition of rational knowledge and put to practical purposes. As far as primitive man has really obtained the mastery of natural forces and of the forces in his own nature, he relies on science and on science alone.

True, science advances, and modern science has grown out of all recognition from its humble origins. Science is conscious of its power and of its steady advances; proud of its ruthless conquests of fields hitherto left to mysticism and speculation, or to religious dogmatism. At times it becomes, therefore, arrogant and aggressive. Even more

so because often it has had to be on the defensive. Religion and magic do not always give science its due, nor make way graciously and wisely. We had our Fundamentalists from the time when Galileo was tortured, to the somewhat less dramatic but more dramatised performances of the late W. J. Bryan. Fundamentalism naturally exists in primitive savagery also, for their traditional routine, magically or religiously sanctioned, opposes all innovation and change. In *savagery*, fundamentalism is, on the whole, a beneficent force, though never a very amiable one.

The savage, I repeat, has got a firm grip on his science, even as his science keeps him well under its control. But his science fails him at times. Does our science, of which we are so proud and confident, never leave us in the lurch? It has not yet domesticated luck, chance, and accident. It cannot prevent earthquakes and famine, war, crime, or disease. So that even we, you and I, when too much at the mercy of hazard, become superstitious and repair to magic. You and I have our mascots and talismans, our signs and omens, our little ritual of salt and of mirrors, of new moons and of ladders. We smile at them but we practise them a great deal more seriously than our smiles might warrant. Nor can they be dismissed as insignificant survivals from primæval times. For they show as rank a growth on the most recent soil of human nature as on the most primitive.

We even see big systems of modern magic, of practical utilitarian belief, sprouting under our very eyes. Take Christian Science or the recently re-established Astrology, Faith-healing or Theosophy, Clairvoyance or the revelation of medium and table-rapping which calls itself Spiritualism. One and all are new, strong, vital forms of modern civilised belief. They all contain a genuine

response to a real need. But in my opinion they resemble primitive magic rather than religion, both in what they are and in what they do. With all that I regard them as highly respectable, for they seem to be indispensable.

And so within the context of primitive culture is also primitive magic, in which the savage tries to harness his luck and to bribe his chance, by spell, ritual, and taboo. Magic flourishes wherever man cannot control hazard by means of science. It flourishes in hunting and fishing, in times of war and at seasons of love, in the control of wind, rain, and sun, in regulating all dangerous enterprises, above all in disease and in the shadow of death.

We must guard against the mistake of assuming that magic represents primitive science. Magic never undertakes to do that which primitive man can easily achieve by knowledge, manual skill, and bodily effort. The savage never digs the soil by magic, nor does he throw his spears by ritual or sail his canoes by spell.

In Melanesia I studied an extensive and complicated system of garden magic. The soil was first blessed for fertility in general; then the plots were cleared by perfectly rational and practical procedures. A second magical ceremony followed to fumigate the cleared ground and thus prevent blights, pests, and insects. Then, again, came planting, done skilfully, practically, and scientifically. But when the plants sprouted and there was nothing better to do but to hope for good luck, magic again was enacted in ceremony after ceremony, designed to make the crops strong and good. And so throughout the whole series the rites alternated with the activities, each aspect, the rational and the magical, kept absolutely distinct from the other. The same is true of most Melanesian magic and of magic all the world over.

You can see, then, the relation of primitive magic to primitive science : they assist each other and co-operate, but never trespass on each other's preserves. You can see, also, the utility and the function of magic. Sociologically, it is an organising force ; it brings order, rhythm, and control into the practical activities. The magician becomes the natural leader and often grows into the chief or the king. Individually, it gives man confidence and allows him to act firmly in the teeth of adversity and heavy odds.

Magic, then, has its own cultural task to perform. It has a value for primitive man and for primitive culture, and in all this its province and its function are different from those of primitive science.

It also differs from religion. For, apart from magic and from science, man also turns to nature in a religious spirit. Abundance of food and material welfare in general are, to primitive man, the primary needs of normal life. They are also the condition of any spiritual advance. But abundance of food and of goods is given to man independently of his efforts, often independently of his magic. Primitive man, even as civilised, feels an autonomous purpose in nature which at times rewards, at times punishes, and invariably follows its own mysterious way. Man naturally turns towards this purpose or providence ; he personifies it and tries to propitiate it. This is the foundation of nature-worship, which takes various forms, of which the most primitive, perhaps, is totemism. But all nature-worship implies the deification of natural forces, the admission of a purpose, a providence, a personal guidance in the Universe.

Our short, but, I trust, convincing glimpses into the drama of primitive life demonstrate one thing : the two

main sources of religious inspiration are the desire for immortality and a craving for the communion with God. In affirming this I find myself in opposition to most current theories. Professor Huxley, who gave such a masterly summary of current views, specifically told us that God and immortality play no part in primitive religion. But I find that these are the twin needs which we all feel, which man has felt from the beginning, whenever he has been unable to face his destiny. In all this, religious belief is not a mere emotional effervescence, still less an intellectual interpretation. Religion promises immortality for man, and it reveals to him his God or his gods. It is this active or creative side of religion which seems to me to be the most important, and on which I have placed the greatest emphasis. Thus, the comparative science of religion compels us to recognise religion as the master-force of human culture. Religion makes man do the biggest things he is capable of, and it does for man what nothing else can do ; it gives him peace and happiness, harmony and a sense of purpose ; and it gives all this in an absolute form.

You can see that, throughout all this, I have spoken of religion in general, bringing the primitive and the civilised together, stressing the similarity between them. But I do not want you to forget all that is crude, cruel, and degraded in the religions of the savages, the ordeals and obscenities at initiation, the horrible rites of death, disgusting and murderous, the licence and degradation of the marriage ceremonial—all this and a great deal more could be adduced to make a heavy indictment of primitive heathendom. And yet, the cruelties and ordeals often function as tests of endurance. They assist the moral training in self-control which frequently goes with them. Licence

at a wedding is often the final fling of pre-nuptial libertinage, a farewell to what is henceforth forbidden. The ritual at death serves to emphasise its solemnity and the solidarity of the dead with those who are killed to accompany them.

Black magic, again, which consists in the tampering with the health and life, as well as with the wealth and happiness of others, seems at first sight to be wholly evil ; but it is often used for good, and it has its good and comforting sides. It makes disease and decay appear man-made and artificial, hence remediable. In fact, all savage sorcerers are able to cure as well as to kill. Black magic, also, though often used with malice for oppression or blackmail, is more frequently employed as an instrument of rough justice. It is used to redress wrongs and to buttress established power and privilege. It is a conservative force, and, as such, on the whole valuable in a primitive community. Black magic is like a sharp sword, two-edged, ready for justice and for crime, but, under primitive conditions, very useful. With all this, we do not want to indulge too freely in the apologetics of darkest primæval heathendom. Primitive religion has its shadows ; so have our religions. The real point, however, which I want to make is that religion, even at its worst, is never completely useless or wholly evil. Even in its lowest forms it has a divine spark, and when I speak of 'divine' I express simply the point of view of the believer and not my own. As an anthropologist I can speak of the 'divine' only as it manifests itself to man and in man.

The comparative science of religions has no warrant to declare the absolute, transcendental truth of any one religion. Since religious revelation is an experience

which, as a matter of principle, lies beyond the domain of science, either discipline is sovereign and independent, and neither can testify for or against the other. Speaking as an anthropologist, I have, therefore, to associate myself with the affirmation repeated by all my collaborators in this series—that religion and science need not be in open conflict, since their respective aims and provinces are distinct and independent.

You might like, however, to know my personal opinion as to the relation of science and religion. Let me, then, speak, not as a specialist, but simply as a thinking and feeling man.

Personally, I am an agnostic. I am not able, that is, to deny the existence of God : nor would I be inclined to do so, still less to maintain that such a belief is not necessary. I also fervently hope that there is a survival after death, and I deeply desire to obtain some certainty on this matter. But with all that I am unable to accept any positive religion—Christian or otherwise. I cannot positively believe in Providence in any sense of the word, and I have no conviction of personal immortality.

Thus, as you see, I profoundly differ from the confident rationalist or disbeliever of the past generation or two. We all know the story of La Place and the discussion which he had with Napoleon the First about his system of Celestial Mechanics. The Emperor asked him : ' What place have you given to God in your system ? ' ' Sire,' was the answer, ' this is an hypothesis of which I have never felt the need.' It is the proud answer of a confident atheist, but it does not ring true to the humble agnostic. On the contrary, I should say that God is a reality and not a hypothesis, and a reality of which I am in the greatest need, though this need cannot exist, or

fulfil. The typical rationalist says : ' I don't know and I don't care '. The tragic agnostic would rejoin : ' I cannot know, but I feel a deep and passionate need of faith, of evidence, and of revelation '. Personally, to me, and to those many who are like me, nothing really matters except the answer to the burning questions : ' Am I going to live or shall I vanish like a bubble ? ' ' What is the aim, and the sense, and the issue of all this strife and suffering ? ' The doubt of these two questions lives in us and affects all our thoughts and feelings. Modern agnosticism is a tragic and shattering frame of mind. To dismiss agnosticism as an easy and shallow escape from the moral obligations and discipline of religion—this is an unworthy and superficial way of dealing with it.

Is science responsible for my agnosticism and for that of others who think like me ? I believe it is, and therefore I do not love science, though I have to remain its loyal servant. Science deals with truth and with evidence, and it develops a critical sense and a passion for full experience which spread beyond its own limited domain. Now, religious truth is vouched for by two sources of experience. We have in the first place the original revelation, handed on in religious teaching. This is the foundation of the great historical religions, notably of Christianity. And then there are the miracles and disclosures of the present day on which most of the new-fangled creeds are founded. Science has spoilt us for the unquestioning acceptance of truth at second-hand—the truth of tradition or of the Gospels. If there ever existed a real experience, if the truth of divine existence is there to be revealed, I rebel against the assumption that it has been shown in some dim past to my mythological forbears, and that it is not vouchsafed to me to-day and in a manner so convincing

that there can be no doubt or cavil. The religious person would say, of course, that he does receive the revelation of divine truth. I can only reply that just here there seems to be an unbridgeable gulf between faith and agnosticism.

The comparative science of religions shows, moreover, that the same eternal cravings of the human soul have been satisfied by a variety of obvious fictions, which have worked as well as the nobler religious truths of our own culture. Thus, the realities of religious belief, however highly we may rate their value, appear almost as instruments created for a special need. The poison of pragmatism—truth measured by utility—is nowadays invading the comparative study of religions as well as all philosophy and science, and pragmatism is the death of religion as well as of metaphysics.

When I come, on the other hand, to the modern forms of revelation, to contemporary miracles, to faith-healing, to spiritualistic mediums, to palmistry, to the brass tablets of a Joseph Smith or the visions of a Mrs Eddy, all my scientific morals of method and evidence are roused to protest. The evidential value of all this machine-made revelation, of this surreptitious communion with the beyond, I find worthless, and as an æsthetic or emotional experience, distinctly unattractive. Nor can I accept the inner revelation of Divinity as a system of ideals—such as Professor Haldane developed before us in a previous talk. His God is too abstract, too impersonal, to satisfy my craving for a real communion with the personal Guide of the Universe. A belief of that type contains no guarantee of personal survival after death. And without a personal God and the belief in immortality, I cannot conceive of a living religion. Moreover, is it true that the ideals of

truth, and beauty, and goodness really unite all men or most men? Is the modern world, with its devastating wars, its racial, national, and class hatreds, with its mean rapacities and wholesale exploitations—is our world really governed by this inner and universal revelation of truth and harmony to all men alike? I see no trace of such control. I feel far nearer to the established, traditional creeds, which appeal to me æsthetically and morally—and for them I have a deep reverence.

Is there any hope of bridging this deepest gulf, that between tragic agnosticism and belief? I do not know. Is there any remedy? I cannot answer this either. What can help us, perhaps, is more and more honesty, more outspokenness and more sincerity.

It is in this spirit that I have described to you my personal position, because I felt it my duty to be sincere and outspoken. Those of you who are fortunate enough to believe, or equally fortunate positively to disbelieve, will not have detected any missionary accents in my confession of faith. All my scientific evidence tends to show that there are no reasons and no room for conflict between science and religion, but, in my personal experience I have found that science is dangerous, even, perhaps, when it does not destroy faith completely. Because, through it all and above all, though I am unable to worship any Divinity, I have almost come to worship, certainly to revere religion.

In all its manifestations—animism and totemism, nature cults and ancestor worship, prayers to Providence and administrations of sacraments—religion, civilised or primitive, gives man what neither science nor magic can give.

Religion gives man hope of immortality and the ritual

means of achieving it ; it reveals the existence of God or Providence and tells how communion can be established : it affirms the meaning of the world and the purpose of life ; and, through its sacraments, it allows men to obtain a greater fullness of life. Religion gives man the mastery of his fate, even as science gives him the control of natural forces, and magic the grip of chance, luck and accident.

VI

THE VERY REV H. R. L. SHEPPARD

Dean of Canterbury

I REPRESENT nothing higher than the untutored intelligence of the average man. That doubtless is why I was invited to address you. Most of the speakers in this Course have been distinguished and reverent-minded scientists. Though they differ from one another in their outlook and beliefs, they are alike in this—that scientific study is their primary interest.

A man's primary interest in life is in fact his real religion, whether he realises it or not ; for religion, as I understand it, is either a manner of life or a mere pretence.

Science is not the primary interest of my life. My main interest is the Christian religion ; by which I mean, Jesus Christ, His views about God, and His Sermon on the Mount. Scientific study has never, I am afraid, occupied any great space in my life ; but, of course, I recognise that Science has made, and is making, a profound difference to my manner of living every day and every hour, and I am (who isn't ?) increasingly aware of my indebtedness to its triumphs. But especially am I grateful for its profound and thoroughgoing devotion to Truth.

I think I am right in saying that all the great discoveries of science are due to its steadfast pursuit of truth for its own sake. The practical application of science to the material needs of mankind—however important—is an altogether secondary thing. This devotion to Truth *should* be an essential part of the adventure of Christianity.

In St John's Gospel are these words : ' If ye abide in my word, then are ye truly my disciples, and ye shall know the truth, and the truth shall make you free.' Scientific truth has indeed set men free, in ever greater measure, from the haunting tyranny of ancient fears and superstitions. It has enlarged, in an amazing way, the boundaries of life. Sometimes when I read Our Lord's words, ' Ask and it shall be given you, seek and ye shall find, knock and it shall be opened unto you ', I realise how at times it has been the scientist rather than the Christian who has responded.

But not all the blame for the conflict between Religion and Science rests upon those who profess and call themselves Christians—not all scientists, in the past or in the present, have shown either the interest in religion, which so many leading scientists are displaying to-day, or such readiness to acknowledge the limits of science as some of those who have lectured in this series have done. Indeed, for some years now, it has seemed that the leading minds in the religious world have appreciated the scientist's point of view a good deal better than the scientists have appreciated theirs.

It cannot be denied by anyone who has tried to understand the controversies between theologians and scientists during the last century, that if the theologians have often tried to defend propositions which have little to be said for them, beyond the fact that for centuries they have been traditionally received, the scientists have often extended mechanistic theory, which has proved fruitful in their own proper field of scientific research, to fields outside their province, and have tried by this means to explain away religion and to reduce life to a meaningless resultant of purely mechanical forces. If theologians are often far

too slow to incorporate into the body of their thought and teaching the new discoveries of truth made by science, it ought to be remembered that amongst scientists themselves new theories rightly enough take considerable time to win anything like universal acceptance, and until they have won such acceptance it is impossible for theologians, who from the point of view of science are mere laymen, to accept this as part of established truth. When upon scientific questions the doctors (of science) differ, how shall the mere theologian decide which of them is right? Of course the enlightened theologian would rightly agree with Professor Huxley, that 'religion on its theological side should continue to take account of the changes and expansions of the picture of the universe which science is drawing', but how is he to do so decidedly while different scientists are changing and expanding the picture in different, and sometimes mutually contradictory ways? For it is still true that the conclusions of different scientists are influenced very often by the particular philosophy which consciously or unconsciously colours most of their thinking.

Again, when a distinguished biologist speaks to me about the proper subjects of his science, I am more than ready to acknowledge and to submit to his authority; but when, ceasing for the time being to speak as a scientist and adopting the role of an amateur theologian, he tells me that he has reached the conclusion that there is no God and proceeds to give me singularly inadequate reasons for his belief, or should I say unbelief, he can hardly expect me to embody his conclusions in my theology, just because he happens to be an authority on biology.

My first business, it seems to me, as a learner, a student and a teacher of the Christian religion, is to continue

seeking more and more earnestly to know, and to interpret to others, the mind of Christ ; and even in this task I gladly and gratefully admit that, if not directly yet indirectly, science has helped me enormously, and will continue to help. Yet I expect I shall continue to feel as I have often felt in the past, that when pure intellect has shot its bolt, much remains to be said, which is not the less true because it requires for its expression the language of the poet rather than the sage. ' Not all men of science,' said Professor Malinowski last week, ' are satisfied with reason and the results of reason.'

However much controversy between science and theology must continue, there is not, and I do not think there can be, any controversy between science and Jesus Christ. Science deals with objective, concrete facts, and deals with them by a method of abstraction, which usually seems (to me) to leave out of its conclusions just the things that matter most to humanity ; but, on the other hand, Jesus gives me precisely that scale of values which, as Professor Huxley for instance admits, science because of its necessarily limited outlook and methods can never give. Science certainly can and does help us to live a fuller and healthier life, physically and mentally, than we could otherwise attain to ; but just as certainly there are whole realms of light, emotional, artistic, and religious, which are altogether outside its legitimate sphere.

As man needs bread but cannot *live*, in any true and full sense of the word, by bread alone, so I am persuaded that he needs science—organised, systematic knowledge of the world in which he lives, and of Nature of which he is himself the crown—but that he cannot live in the fullest, widest, and noblest sense of the word, by science alone ; for, as the late Poet Laureate said in *The Testament of*

Beauty : ' In truth " spiritual animal " was a term for man nearer than " rational " to define his genus ; Faith being the humaniser of his brutal passions, the clarifier of folly, and medicine of care, the clue of reality, and the driving motive of that self-knowledge which teacheth the ethic of life.' ' Thou, oh God, hast made us for Thyself, and our hearts know no rest until they rest in Thee.' 'The old words of St Augustine remain as true for man in the modern world as they were for him who first uttered them.

It is through the practices of religion, prayer, meditation, and worship that the spirit of man rises above the flux, the distractions and disunities of this world of time and space, and that unchangeable law of unalterable sequences, which science has revealed, and which is to the believer only the most striking evidence of the steadfastness of the mind of God, into that eternal world where one in spirit with the author and sustainer of his life, he finds the peace which, while in very truth it passeth understanding, is none the less the most priceless (and most practical) of all experiences that mortal man can have.

Whoso hath felt the Spirit of the Highest
Cannot confound nor doubt Him, nor deny ;
Yea, with one voice, O world, tho' thou deniest,
Stand thou on that side, for on this am I.

These well known words which Frederic Myers put into the mouth of St Paul have found and will, I am persuaded, continue to find an echo in the heart and mind of hundreds of thousands of believers, and it is for this reason amongst others that I have not the slightest fear that science or scientists can ever explain away religion, or

destroy its basic truths, among which I include the passionate conviction, which alone satisfies a man's intellect as well as his heart, that man can and often does enter into personal communion with his Creator.

Would you listen to words written by the late Lord Balfour (Arthur James Balfour) in his *Autobiography*? He is paying tribute to his mother. Speaking of the intellectual difficulties of his youth, and of her attitude towards them and him, he writes: 'She saw that the difficulties to which I have adverted were of a kind which each man must deal with for himself, and in his own way. She was never tempted to discourage scientific study; she never treated it as dangerous to the higher life; she never took refuge in bad science when good science appeared to raise awkward problems. On the other hand, she never surrendered her own convictions as to the inestimable value of her central religious beliefs. This point of view, if I rightly represent it, may have lacked theoretic finish; but it appealed to me in 1866, and after more than sixty years' reflection, it appeals to me still' (1928).

This is the opinion of a very wise man, and I quote it for the encouragement of some who are listening. I do not think you and I need apologise if we hold on to our beliefs as simply and, let me hasten to add, as surely.

I could never subscribe to the plea that we are not meant to use our intellect with the utmost freedom in matters of religion. Each of us must be a free thinker, in the right sense of that word; but I do believe that intuition or inward vision can often take us out beyond mere logic, to the land where faith raises its head. 'Whereas I was blind, now I see', is not the expression of merely foolish credulity. When a man has reached inward certainty, he is not afraid of criticism.

Let me remind you of what Dr Cairns has written in a book which is not new but is well worthy of your attention, *The Reasonableness of the Christian Faith*. The author says that the following story about the late Lord Kelvin was told him by Principal Lindsay. Lord Kelvin said that he had never reasoned his way quite up to any one of his great scientific discoveries. He brooded over all the facts which seemed to him relevant to his problem, until there came a moment when his mind took a life-or-death leap away out into the unknown. He felt, in the very marrow of his being, the conviction that the solution lay just *there*, and it did. Dr Cairns declares that when he heard that story, he thought, 'How wonderfully like this is to faith—the spiritual in man that goeth out, not knowing whither it goeth, because it desireth a better country, even a heavenly'.

It is, after all, not to science but to religion that men turn instinctively in the times of their profound crises, whether national or personal, in great joy or in heart-breaking tragedy. Who will deny that they are right and wise to do so, when it is realised what stores of new faith and hope and courage; what new vitality; what fresh determination to face and turn to good all that life brings, whether of good or evil; what (if I may use an ugly but expressive word) guts have been drawn by multitudes of men from such moments of religious intuition? Since men first learned to see in the tragedy of the Cross and its sequel, in the new faith and courage of the first disciples, that there is no tragedy however apparently inexplicable which love has not the power to turn to greater account, not only for those upon whom its full weight falls, but through them for humanity at large, it has been possible for men at least to carry on, and even for the great-souled

to cry : ' Oh death, where is thy sting ; oh grave, where is thy victory ? ' And all the astonishing progress of science, so far from making that lesson unnecessary, has only made our need for it the more profound ; for if by its discoveries science has done much to mitigate the physical suffering of mankind, and has even given us some hope of the ultimate conquest of disease, it cannot be denied that it has at the same time added much to the tragic side of life. All, or almost all, of its greatest triumphs have been won through incredible pain and suffering. How many martyrs to science have given health and life in the cause of research in Hospitals and Laboratories, as well as in perfecting new inventions which, rightly used, may mean so much to the progress of mankind ? Indeed, if the faith that removes mountains ; that persists in believing those things to be possible which the mass of mankind calls impossible ; if hope which inspires men to go on and ever on to new experiments, in spite of oft-repeated failures ; if that utter self-forgetfulness and self-sacrifice which are the only evidence of true love ; if those great cardinal Christian virtues are, as I believe they are, characteristic of the great pioneers of science—then we who call ourselves Christians ought to reverence these men as amongst the best and noblest of those who are not against us but on our side. They have gained victory because they sought not it but Truth.

I believe that if the leaders of science and religion—each recognising the need of what the other has to give (as I think you will allow each is increasingly ready to do)—would seek to work together in closest harmony for the common good of mankind, that golden age of which scientists have sometimes dreamed, and which

Christians are wont to call the ' Kingdom of God on earth ', might indeed soon be on its way. At the moment it tarries. Surely we need not less religion or less science, but more religion and more science—and, above all, better religion and better science. Scientists and leaders of religion working together, would, I fancy, be strong enough to ensure amongst other things what neither of them can do while they regard one another with mutual suspicion if not open hostility—that the inventions of science were used, not for the purposes of destruction, but for the benefit of mankind. If, for instance, the leaders of science and religion came together before the nations of the world to proclaim that to use scientific discoveries for the purposes of the destruction of human life is at once a denial of true religions and the prostitution of science, would it not give an enormous new impetus to the cause of international peace ?

I am not asking, or even desiring, that controversy between Scientists and Theologians should cease—it cannot cease. It would, I believe, be a pity if it should cease while science and theology are both so imperfect, and while to attain to a knowledge of ultimate Reality, advance must proceed along more than one path ; but discussion and controversy between friends who are seeking the Truth, cost what it may, and who find that while there is much that they are agreed upon, there are many things about which they cannot as yet see eye to eye, may be one of the best and most fruitful things in life. It is a very different thing from controversy conducted in a spirit of mutual antagonism. We need much more light in our controversies, and much less heat, than in the past. Nobody who knows the trend of modern religious thought, and has read recent statements of Christian

leaders—as, for example, those which were issued on the Doctrine of God from Lambeth some weeks ago—will question the progress that has been made since the controversies of the Victorian days, in the direction of truths learned from science, and I think the lectures given by my distinguished predecessors in this series are sufficient proof that the scientists on their side have moved forward to a completely new temper and outlook in regard to religious questions. May not this fill us with hope, not only for the future relations between religion and science, but for the common service that they may render together to the highest interests of mankind ?

VII

CANON B. H. STREETER, D.D., F.B.A.

I WILL begin by recalling some points made by previous lecturers in this course. I do this for two reasons.

First, because when I quote a sentence in which they have summarised an argument of some length, it will bring back to your minds the arguments which they used ; and that will enable me to take for granted, as a basis for my own further arguments, positions which otherwise it would take me some time to justify or explain. Secondly, a remarkable thing about the foregoing lectures has been the way in which their general drift has been moving in one and the same direction. And if a few quotations help to bring this out, it may be perhaps of interest to some of the listeners, as well as an assistance, in establishing a basis for my own argument.

An idea that has kept on recurring is that science by itself is not enough. Science has given humanity so much that it compels us to ask for something more—and something of a *different* character. Forty years ago intellectuals were crying out for liberation from the dominance of religion ; to-day they are beginning to be frightened by the victories of science. Human life, as Dr Barnes urged, has always been a tragic business : ‘ For most men and women opportunities are painfully few : their powers have no chance of finding expression ; a narrow round cramps their growth. For all of us life is absurdly brief.’ These things, of course, have always been ; but somehow the progress of science has made us see our insignificance and littleness more clearly ; and so

we feel it more acutely. 'Our universe' (he continued) 'seems to be millions of millions of years old; yet man counts himself fortunate with four-score years. . . . We are shut in between unfathomable immensities. . . . The more sensitive we become to beauty and goodness, the more do we recoil from the moral ugliness and brutality which seem to pervade that animal kingdom to which we belong. . . . To earthly oblivion our race is doomed. We shall pass away like the many extinct creatures that in turn have lorded it over the land where it is our fate to live and die. Will the spirit within us likewise perish, or—and here faith raises its head—is there perchance a spiritual realm which is our true and eternal home?'

But suppose we decide that this earth, and our four score years upon it, are all. What security have we that the progress of scientific discovery is going to make that little life happier and better? It is just here that a new doubt has arisen for our generation. Scientific discovery has placed undreamed-of power in the hands of man—and will place more. But it remains to be seen whether man will use this power for the betterment of his condition here on earth, or for his enslavement and destruction. It was the Great War that taught Europe to see that this is still an open question. Science is here; and in the field of science, if nowhere else, further progress may be taken for granted. But is this a fact to be regarded with hope, or with fear? That question will be decided, not by science itself, but by something outside science. In the words of Professor Julian Huxley: 'What man shall do with the new facts, the new ideas, the new opportunities of control which science is showering upon him does not depend upon science, but upon what man wants to do with them'.

What man *wants* to do is largely a matter of whether or no he has a religion, and whether that religion is a good one or a bad.

I stress this point of a *good* religion. Professor Malinowski in his lecture argued that among savage peoples religion is often an advantage, even though connected with superstitious beliefs and with practices repellent to civilised man. That may be so in savage communities ; it may even hold good of some individuals in a civilised State. I have known people who have been rescued from evil courses or from despair by kinds of religion which to me seem largely made up of superstition. You have all of you known such people. Nevertheless, no religion which rests on superstition can aspire to guide mankind in the right direction at this crucial stage in the history of human progress. 'The problem', again to quote Professor Huxley's opening lecture of this course, 'the problem of what man will do with the enormous possibilities of power which science has put into his hands is probably the most vital and the most alarming problem of modern times. At the moment, humanity is rather like an irresponsible and mischievous child who has been presented with a set of machine tools, a box of matches, and a supply of dynamite. How can religion expect to help in solving the problem before the child cuts itself or blows itself up, if it does not permeate itself with the new ideas, and make them its own in order to control them ? That is why I say—as a human being and not as a scientist—that it is the *duty* of religion to accept and assimilate scientific knowledge'.

This warning is impressive—alike to those who put their trust in science alone, and to those who think that anything that is called by name 'religion' will serve the

present need. Emotional appeal, the glamour of ancient tradition, the bare authority of sacred book or venerable church, is not enough. An immense responsibility rests on the leaders of the churches in our day. If man is not to perish in the fire that science has kindled, he must be able to worship the Lord his God, not only with all his heart and all his soul, but also with all his *mind*. And to worship with all one's mind is much easier to-day than it was thirty years ago on account of changes in the outlook of the leading representatives both of science and of religion.

'Dick' Sheppard did well, I think, in his lecture to call attention to the part of the Report of the Lambeth Conference which deals with 'The Christian Doctrine of God'. This represents a genuine piece of corporate thinking, and does achieve its aim of expounding what is meant by the word God in a way that is congruous with the best scientific and philosophical thought of the present day.

You will have noticed that the eminent scientists who have given the earlier lectures in this course have all emphasised, in one way or another, *limitations* in the kind of knowledge of Reality attainable along the line of the physical sciences. They have all, in one way or another, accepted the position that the knowledge which we get from science gives only one aspect of Reality as a whole. To quote the picturesque illustration of Sir J. Arthur Thomson: 'Science fishes in the sea of reality with particular kinds of net—scientific methods—and there may be much in the unfathomed sea which the meshes of the scientific net cannot catch'. Again, Professor Haldane argued that one important element in that Reality, which the biologist, even in the course of his scientific

investigations, is compelled to recognise, is the fact of life ; and this is a fact not completely explicable in terms of conceptions like matter and energy, as these are used in chemistry and physics. ' The attitude of biology ', he said, ' is that, when we cannot see any further into our experience than physical science is capable of interpreting, we are right to adhere to preliminary physical and chemical interpretation ; but where we do see further, as in the observation of life as such, we must adopt appropriate interpretation, and can do nothing less than make use of the distinctive conception of life.'

The view that there is more in Reality than can be apprehended by the abstract methods of pure science is one that is no less emphatically maintained by scientific thinkers whose attitude of mind is antipathetic to religion. Mr Bertrand Russell, for example, who from time to time amuses himself in denouncing the Christian religion—I use the word ' amuses ' advisedly, he so evidently enjoys doing it—nevertheless devotes his more serious writings to the task of annihilating the intellectual basis of scientific materialism. I quote a couple of sentences [the italics are mine] from his recent book, *The Analysis of Matter* :

' While, on the question of the stuff of the world, the theory of the foregoing pages has certain affinities with idealism—namely, that mental events are part of that stuff, and that *the rest of the stuff resembles them more than it resembles traditional billiard-balls*—the position advocated as regards scientific laws has more affinity with materialism than with idealism ' (p. 388).

By ' traditional billiard-balls ' he means material atoms as these have been commonly conceived.

Again he writes : ' As regards the world in general, both physical and mental, *everything that we know of its*

intrinsic character is derived from the mental side, and almost everything that we know of its causal laws is derived from the physical side ' (p. 402).

Personally, I do not ask for more from science than is freely presented to me by Mr Russell in these two sentences. In these two passages he asserts his belief that the ultimate ' stuff ' of Reality is more like what we know as ' mind ' than like what (until recent physics had split up the solid atom into points or waves of electric force) was commonly meant by ' matter '. Having reached this point, Mr Russell declines to go further. As a scientist he is right in so declining ; for he has brought his argument to the point where the methods of science will go no further. But, if he speaks as a philosopher, he is not entitled to stop at this point ; or, rather, he is not entitled to ask me to stop. To raise the question, whether there may not be ways of knowing other than, and different from, those which are used by science, is to raise a *legitimate question* ; and later on I propose to raise it.

I read in *The Times* a few days ago an account of a lecture (now published under the title of *The Mysterious Universe*) by the famous astronomer Sir James Jeans. It deals mainly with the question of the bearing of recent scientific thought on the nature of Ultimate Reality. He reaches a conclusion which goes a step further in the direction of belief in God than I should myself have thought it was possible to go merely from the scientific standpoint.

' To-day ', he says, ' there is a wide measure of agreement, which on the physical side of science approaches almost to unanimity, that the stream of knowledge is heading towards a non-mechanical reality ; the universe begins to look more like a great thought than like a great

machine. Mind no longer appears as an accidental intruder into the realm of matter ; we are beginning to suspect that we ought rather to hail it as the creator and governor of the realm of matter—not of course our individual minds, but the mind in which the atoms out of which our individual minds have grown exist as thoughts.'

From the scientific side I am not competent either to criticise or to commend the arguments by which Sir James Jeans reaches this remarkable conclusion. But the fact that such a conclusion has been reached, by such a mind, and by such a route, does strengthen my confidence in results which I have myself reached along a quite different line of inquiry.

For myself I would start, like Professor Haldane (and accepting his *caveat* against ' Vitalism '), by emphasising the fact that no view of the nature of Reality is intellectually tenable which does not give an adequate account of the phenomenon we call Life. More especially must it account for life at the level of conscious intelligence as we know it in man—where we call it personality. Personality is of all things the most difficult to understand or to explain ; but just for that reason any explanation of the universe which leaves this fact unexplained has shirked its main task.

The argument I am about to put forward may perhaps seem to some a trifle difficult. That is partly because I have not time to amplify it at sufficient length ; it is mainly because ' mind ', ' consciousness ', ' personality ' (or whatever you like to call it) is always and necessarily the most difficult of all things to think about—simply because it is precisely *the thing by which we have to do the thinking*. Again, the things we are mostly in the habit

of perceiving and arguing about are things which are observable and external to ourselves ; but mind itself is not external to ourselves and it is something which we cannot directly observe ; it is something we know only from within. To put it in another way, what we call ' matter ' is something we can see, weigh and measure, and therefore can quite easily talk about and think about ; whereas what we call ' mind ' is something we can neither see, nor weigh, nor measure. It is, therefore, a far more elusive thing ; indeed, we only know it is there at all because it does the seeing, measuring, and weighing of other things.

Now mind—or consciousness, to use the wider and better term—does something besides seeing, weighing and measuring, it also feels. And it feels not only in the sense of noticing that ice is cold and that fire is hot, or even in the sense of judging this dish to be more palatable than that ; it apprehends things as having *quality*—this is beautiful, that is ugly ; this is noble, that is contemptible ; this is right, that is wrong. In other words, it is of the nature of consciousness, not only to observe, but also to value ; or, rather, in the very act of observing, it also values. Indeed, even in pure science, observation is made only of things that are of interest (i.e. have value) in the particular field which is being investigated. It appears, then, that it is of the essence of consciousness, not merely to apprehend, but to apprehend *qualitatively*. Now the effort of science is, so far as possible—it is never completely possible—to get rid of the qualitative element in apprehension. So far as possible, science only deals with what can be measured ; and so far as possible it deals with this by means of mathematical equations which express measurement. That is what has been meant by

previous lecturers in this course who have spoken of the methods of science as being 'abstract'.

But in human affairs it is precisely the qualitative which is most important. Quantity affects quality, but it is not the same thing. Somebody once said that, if Cleopatra's nose had been three-quarters of an inch longer, the history of the world would have been different. Undoubtedly if Antony had resisted the charms of Cleopatra, much history would have been written otherwise; but Antony did not apprehend those charms by the quantitative medium of a foot rule. In real life the qualitative is what matters most. But it is extraordinarily difficult to deal with things, to discuss them in relation to one another, unless we can represent them on some quantitative scale. To explain why one picture is really *better* than another is extremely hard; to price one at £100 and the other at £50 is perfectly simple. It is a standing pitfall of the present age to suppose that once you have priced things by their cost—or persons by their earnings—you have found out their real value. It is, I would urge, no less a pitfall for the thinker to suppose that, when you have measured everything in the universe that is measurable, you have found out its real nature.

Quality is something of which the apprehension is fundamental to life. If, then, the 'stuff' of which Reality is made is in any way akin to life or mind, *quality* is as fundamental in it as quantity; value is as real as measurement. But apprehension of quality, if it is to pass from one man to another, must find a method of expression. How, then, can we express quality?

There are two activities of the human mind which endeavour to express the qualitative aspect of things, art

and religion ; and art and religion employ for that purpose methods quite different from those of science. The artist has an inward apprehension, a vision, we may call it, a turmoil or a peace in his soul, a reaction to experience individual to, and characteristic of, himself ; and yet it is something which he feels to have a worth which compels and justifies its expression. He expresses it by chisel, brush, word, or note. But the creations of the artist do not pretend to represent Reality in at all the same way as do the formulæ of the scientist ; what the artist, poet, or musician aims at is to produce something which will evoke in the spectator a qualitative experience similar to that which he himself has enjoyed.

Religion, in this respect, is a kind of half-way house between science and art. Religion, like science, is vitally concerned with truth, it endeavours to express an aspect of Ultimate Reality ; but the truth about Reality, with which it is concerned, is a truth of quality rather than of quantity. Religion, therefore, must state truth in a way which is likely to evoke a *qualitative* apprehension of it. No one ever applies measurement to God, and asks how large He is ; everyone wants to know in what sense you can apply to Him the term ' good '. The saying ' God is love ' is a statement of quality. The aim of religion is to make people apprehend something about the quality of the power behind the Universe—Its mystery or awe, Its ' friendliness ' or Its beauty—as this quality has been experienced by the great souls of the race. And religion can do this, I suggest, because to certain of the great souls of our race there has come into consciousness, more richly and fully than with ordinary men, the inner quality of that universal life in which we all participate—' in which we live and move and have our being '. ' The Infinite Life of

the Universe—in so far as that life indwells in the race of man—finds in religion an expression of Its own inherent quality ; and It does this most clearly in the consciousness of the men with special genius for religion, whom we name the great prophets of our race. But these must express the visions they have seen, the qualitative apprehension which has been given them, not by the methods used by science, but in forms analogous to those employed by art—the hymn, the dramatic rite, the myth or the parable. That is why religion is so varied. Measurement is definite and simple ; therefore, science is one and uniform. But intuitive insight into the quality of the infinite life is a thing which differs from man to man, from race to race, from age to age. Religions, therefore, are multifarious ; and they vary enormously in the value and depth of what they apprehend.

In the history of religion, as in that of art, we find two interesting phenomena. There is the outstanding creative genius—the great prophet, or the great artist—who perceives and can express what the majority are blind to, or only dimly sense. On the other hand, there are achievements of the communal spirit, of a corporate tradition which, even without the emergence of supreme genius, may produce great results ; Gothic architecture is an obvious example of such corporate achievement in the field of art. Where there has been both the occurrence of supreme genius, and a living society with a creative tradition, we may reasonably expect a deeper, richer and profounder apprehension and interpretation of the Universal Life on Its qualitative side. Bearing this in mind, we see how and why, of all the religions of mankind, there are two which stand out beyond the rest : Buddhism and Christianity. In both of these you have the supreme

genius of the founder and a creative corporate life in the society he founded.

The Buddha and the Christ are in some ways curiously alike, in others strikingly different. The mind of the Buddha was essentially that of a philosopher; the mind of Jesus was rather that of a poet. The Buddha was indifferent to the existence of God or gods (here his followers mostly depart from him); to Jesus the love of our Father in heaven was the supreme inspiration of life. Yet there is a close resemblance between the teaching of the Sermon on the Mount and that of the Noble Eight-fold Path which the Buddha taught. Alike, too, is that spirit of absolute self-sacrifice for the sake of miserable and sinful men which animated the lives of both. Each taught, each lived, a life of service inspired by love.

To my mind the fact is impressive that in both these world religions—these two great intuitions of the race—an almost identical interpretation of the meaning of the founders' personality has been reached in the living corporate tradition of the societies they founded. Each has looked to its founder—to Jesus at once, to the Buddha after an interval of years—not merely as a human prophet, but as an expression in human form of the essential quality of the Divine. Later Buddhism believes in a series of Buddhas or Bodhisattvas; but all or most of these are thought of as manifested in other Universes or other world epochs; and they are really more or less reduplications of the one historic Buddha. That is to say, these two great religions agree in seeing in the personality of the ideal man a mirror of Ultimate Reality—of Reality apprehended as the fount of life, Itself alive, and the ground of all human apprehensions of the beautiful, the good and the true.

The intuition of Europe and of Asia are here not far apart in their interpretation of the nature of Reality. And what came by intuition can be justified by thought. Human personality is a fact ; it is a fact unaccounted for in terms of the mathematical and mechanical conceptions of physical science and, in those terms, it is also unaccountable. It is, then, more than legitimate, it is necessary, for philosophy to use this fact as an index, however imperfect—as a ‘ sample ’, if you like the word—of the ‘ stuff ’ of which Reality consists. The theoretical possibility that no actual historical person, even Jesus Christ Himself, has ever attained to the absolute ideal does not seriously affect this argument. I should myself maintain that Christ did, and that the Buddha did not, attain to the ideal ; but what I am most concerned to urge is that, in so far as any personality approximates to being that of the ideal man, just so far the essential character of Reality on Its qualitative side is in that personality revealed. If, and in so far as, Christ is the ideal man, His personality is a mirror in which can be reflected the *quality* of Reality—that is, the heart of the Infinite being. He is, in St Paul’s phrase, ‘ the portrait of the unseen God ’ ; and if His character is at all an index of the character of God, then St John was right when he wrote down, ‘ God is Love ’.

VIII

THE REV C. W. O'HARA, S.J.

I PROPOSE to start with a quotation to which I will refer more than once during the course of my talk. It was written in the seventeenth century by a scientist—Robert Boyle—in his book *The Christian Virtuoso*. The passage I want runs as follows: 'The book of nature is a fine and large piece of tapestry rolled up, which we are not able to see all at once, but must be content to wait for the discovery of its beauty and symmetry little by little, as it gradually comes to be more unfolded.'

The unfolding has gone on since Boyle's time, and the facts of Nature so revealed have been recorded by science. More than that, at the end of the nineteenth century, it looked as if the pattern and structure of the whole tapestry of Nature was known, even of the part yet to be unrolled. Naturally enough, there was no complete agreement about details, but the main outlines of the whole picture were quite definite and easily grasped by the imagination. One saw the enormous expanse in space and time of the universe, and yet the extreme minuteness of the earth. There was also the picture of the successive stages of progress of the universe, involving in the case of the earth a final stage of stagnation. But what would have astounded Boyle, as a believer in God, was the doctrine that man himself was no more than a part of Nature and his occurrence a very trivial and passing incident of the progress. The picture not only showed that the earth was unimportant, but also that man was still less important. It showed a complete reversal of the traditional

religious doctrines, and it would seem that as the scientific doctrine was true to Nature, religion was not.

The conflict is obvious and yet the truth must be accepted whatever it may cost feeling or sentiment. Knowing by experience how subtle error is, the correct attitude is, surely, a patient scrutiny of the steps leading to such conclusions, and I hope to show that the conflict can be resolved without giving up either science or religion. But I would like to say at once that when religion condemns any particular doctrine of science, it does not do so because it can lay its finger on the scientific error. It only steps in where the scientific theory affects the essential facts of religion, for example, a theory that would make religion sheer superstition or else one that makes man a mere machine with no free will.

To show that the historical conflicts between religion and science have not inflicted mortal wounds on either side is a wide theme. I must therefore limit myself to a few general statements and give some justification of them. From the sixteenth to the eighteenth centuries, the belief in God was a stimulus and guide to scientific discovery. The famous work of Copernicus, published in 1543, is a case in point. Its author—a Catholic priest—was dissatisfied with the prevailing theory of the planets, not because it did not fit the observed facts, but because the geometrical design it supposed the planets to trace out was too clumsy to be the work of an all-wise God. In the next century, Kepler would not have persevered with the enormous mass of astronomical data collected by Tycho Brahe, had he not been convinced that they had a divine order and that his mind could discover that order. This stimulus to scientific discovery continued during the eighteenth century, but with a difference which can be

made clear by an example. Maupertuis discovered a law of Nature that is of very wide use in science. His proof was based on the idea that in Nature, God produced effects with the minimum of effort. However, another investigator, Euler, did not admit the truth of the principle until he had satisfied himself that it did agree with known principles. Here we see science liberating itself from proofs based on the existence of the Creator of the universe. The scientific mind is becoming conscious that its method is self-sufficient, that there is no need to appeal directly to the mind of God, but to the facts. At the same time, their writings convey no hint that they thought any conflict could arise between their discoveries and the truths of religion. God was still the ground of the universe. Indeed, the discoveries were used as additional proofs of the existence of God. Nevertheless, towards the end of the eighteenth century, there arose the doctrine that the world could get on by itself. God was banished from the universe. This was not said in so many words, nor held by all scientists, but it was at the back of many minds. In the nineteenth century, the progress made by scientific discovery was very great, in heat, light and electricity. When Darwin published his *Origin of Species*, it would seem that even life itself was controlled by the mechanism of Nature. We may pause here to see what Boyle's tapestry has become at the end of the nineteenth century.

Mind was but a ripple on the surface of life, life itself was the outcome of non-living material and this inert matter was built up from a few types of atoms and these atoms were governed by unchanging laws. So the whole of the world from man down to the atom is governed by these laws, and its future progress could be foretold. If this picture of the universe was true, of its present, and

past and future, the effect on religion was considered to be destructive.

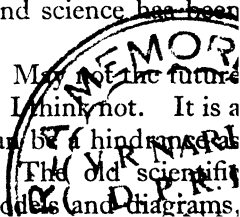
Only thirty years of the present century have passed, and yet the discoveries made in that short time have caused a profound revolution in scientific doctrine. In terms of Boyle's tapestry, the change is like this. At the beginning of the century it was thought that the whole picture was a scene on the sea, whereas now it is thought to be a scene on the land. The analogy is not quite apt, but it will serve for the present if it conveys the idea that the nineteenth-century picture of the basic structure of the universe was somewhat wide of the mark.

It is most important to understand the causes of this change. It is not true to say the change was entirely due to the discovery of new facts, but rather because two scientists had discovered a better way of seeing and interpreting facts already known. I dare not try to explain exactly what they did, but an analogy from wireless may help. Take scientific fact to be the wireless message sent out by the broadcasting station, and intelligence of the scientist to correspond to a receiver. If the receiver cannot be tuned to the proper wave-length, no message is received although it really exists round the apparatus. That would correspond to the case of a mind which cannot grasp certain truths. We all know what that means in trying to teach children. However, this is not quite what I want. Suppose that the wireless receiver is not very sensitive, then it may happen that you only receive some part of the message and yet can make sense of it. Nevertheless that sense is not the full sense of the message sent out, and although the partial message is still part of the complete message, its meaning in the new context is rather different. This, I hope, may convey

some idea of what Einstein and Planck have accomplished. They have acquired a sensitiveness of mental vision—who can say how?—and because of this, they have penetrated more deeply into the secrets of Nature. They accept the facts already discovered, but no longer interpret them in the old way. I am afraid it requires considerable mental effort to follow in the path of these pioneers, but the effort is worth while. For it produces a great liberation of thought. Facts that were considered to be impossible—forbidden was the word used—are now seen to be not only possible, but actually occurring in Nature.

As this improved way of interpreting Nature is still in progress, it is somewhat premature to attempt a definite account of the results obtained, but if we return to the picture of the world, it is somewhat as follows. In the first place, the rigid laws and invariable mechanisms have vanished. Law and order still exist, but with much greater liberty. In fact—as has been said—some scientists are making reparation for past errors by giving freedom not only to man but also to the electron. Again, the world is no longer regarded as being constructed entirely out of inert matter, life is not merely chemical or physical, and intelligence is restored to its proper place as the highest faculty of man. Finally, the Creator is seen to be the origin of the whole universe. So it has come to pass that the gap between religion and science ~~has been~~ closed.

Will the gap ever open up again? May not the future have some surprising facts in store? I think not. It is a commonplace that the imagination can be a hindrance as well as a help to the intelligence. The old scientific method made considerable use of models and diagrams,



but the new way does not provide any clear images of its fundamental ideas. It has to rely almost completely on the work of the intelligence. It is occupied now with symbols and has to treat these by the sheer force of reasoning. This fact ought to prevent any danger of another conflict in the future. I have limited myself in talking about science to the parts with which I am acquainted, and have shown how science by its own methods has discovered the causes of its errors. It had trespassed beyond its proper domain. The divergence which has occurred points out a very important lesson. It is this. The more the intelligence can rely on itself and develop its powers, the more free it is to see and receive the truth. As a consequence, and a vital one, it is very dangerous, even on the new theory, to assert that some event cannot happen, more especially one not directly subject to observation and experiment.

So far I have been looking at truth as discovered by science. I now turn to truth as attained by religion. Is any religion true? Is it not based on imagination or sentiment or feeling? Christianity, most emphatically, at least, asserts the contrary. It holds that its truths are reached by the very same intelligence that is operative in science and with the same certainty. These truths are that God exists, that He created the world, that He created man with an immortal soul and a free will, and finally, that God came into this world as man. Is this last fact true? Christianity appeals to the historical records contained in the New Testament, and asserts that these records are trustworthy, that the events there narrated did happen, even when judged by the severest scientific criticism. From what has been said already, science cannot now object to the occurrence of miraculous events,

for—as we have seen—such things were deemed impossible or forbidden only while science was passing through a transient phase of interpreting Nature in terms of a narrow theory that has now been superseded. However, it is clear that only a minority of men can undertake this long process of checking and verifying the origins of the New Testament. What happens to those who have neither the leisure nor the training to sift the truth of God becoming man in this scientific way? Is it to be supposed that these cannot have certainty, and can only act as if this fact were true? Again Christianity rejects this notion. It will have nothing to do with the idea that religious truth is a mere matter of feeling or a blind leap into the dark. Nor will it agree that a special faculty is required: the certainty is reached by the same intelligence which reaches scientific truth.

Once the Incarnation is accepted as a fact, I cannot but accept the truths of revelation. Though I may be unable to understand the meaning of the truths revealed in the same way that I grasp scientific truth, yet there is as a compensation greater certainty of the truths of revelation. What I do understand and grasp by my intelligence is the complete freedom from error of God made man. And so it comes to pass that I can and ought to accept the truth of His statements whether I do or do not understand all that they mean. The full verification can only come in the future. If, for example, I am told that Baptism has a supernatural effect on my soul, I am certain that this effect does take place, though I cannot give a scientific demonstration which clearly shows this effect.

The religious attitude towards science is now easily understood. In the first place, it seems natural that the task of understanding human nature should come before

the study of external nature. Indeed, this partially explains why the science of Nature did not develop earlier. But if in the name of science doctrines are proclaimed as true which contradict the truths of religion, religion must condemn such doctrines. Religion has not obtained its truths from a merely human intelligence, and so it cannot admit that its facts are wrong. It condemns the scientific error not because it can place its finger on the precise point where the error lies, but because truth cannot contradict itself. It seems to me that while the recent developments have led scientists to admit that their theories are changing—and yet in doing so are converging towards the ideal general theory by slow but sure stages—nevertheless in practice they forget the consequences of this admission. If the scientific theory, as at present formulated, is not the complete one, then it must be conceded that facts forbidden by this theory may or may not be forbidden by a more general and complete theory. The theory as it stands, of course, does predict many facts correctly, and that part of the present theory which does so will live on in the more general theory in a modified form. Here the contrast with religious truth is striking. Religion only asserts those facts about which it is certain, not on its own authority nor because it understands them, but because the source of its certainty is the absolute truth. The control which religion exercises when it condemns scientific error, does not cramp the intelligence but is making an attempt to preserve the mind from narrowness. It would, of course, be more satisfactory if religion could point out where the mistake lies, but it does not pretend to do so. That kind of knowledge has never been assumed to be a part of revelation. Religious authority only knows when the doctrine

stated is contrary to the divine deposit. Yet because of the desire to understand, religion encourages and urges its members to undertake scientific study, precisely in order that the source of error may be detected. Not for one moment does it suppose that the human intelligence which accepts Revelation is thereby incapable of judging the evidence critically and scientifically. On the contrary, it implies that religion has a liberating effect on the intelligence, making it more sensitive to truth. And if religion condemns an error before its source is detected, this is because it remembers its responsibility for each individual soul and cannot let that soul be infected by the passing errors of the generation in which it happens to live.

Science, then, has a place and an honoured place in religion for the reason that it develops the highest possession of man, his intelligence, and enables man to understand God's handiwork. But it is a place and not the whole. Science can weave its theories about the universe, so long as they do not contradict either natural or revealed fact. Just as a scientific theory must be remodelled if an awkward fact appears, so must a place be found in it for religious fact. The real difficulty is the intellectual effort required to frame the new theory. Science itself proves that not many pioneers of this type exist in a generation.

Religion also has experienced similar situations in applying intelligence to its own facts. It does permit a variety of theological opinions or theories provided none of these involves a denial of its facts. It welcomes and encourages faith seeking understanding, and has never imposed any single theological theory as being the only one consistent with its facts. To assert the contrary, as any serious student of theology will admit, is clearly false.

Religion, then, is concerned with a set of facts regarding God, what God is in Himself and His relation to man ; and concerning man, his origin, his main work in this world and his future destiny. It therefore teaches with certainty the vital truths concerning man's development in this world in order that he may reach a final state of perfection. It cannot admit any alternative primary scheme, but it can and does admit subsidiary schemes that promote the happiness of mankind on earth. For example, it can tolerate kingdoms or republics. It can tolerate and encourage schemes for the improvement of the human race, but not those which, while caring for the body, do so at the expense of the immortal soul. And finally, it can and does welcome within its house both theology and science, their theories and their applications in so far as they are true to fact.

IX

PROFESSOR SIR ARTHUR S. EDDINGTON, F.R.S.

IF YOU will look up at the sky in the direction of the constellation Andromeda, and spend a few moments scrutinising the faintest stars you see, you will notice one that is not a sharp point of light like the rest but has a hazy appearance. That star is unique among all that are visible to the naked eye. It is not properly a star; we might rather describe it as a universe. It teaches us that when we have taken together the Sun and all the other naked-eye stars and many hundreds of millions of telescopic stars we have not yet reached the end of things. We have explored only one island—one oasis in the desert of space; in the far distance we discern another island which is that faint patch of light in Andromeda. With the help of a telescope we can make out a great many more, in fact a whole archipelago of island universes stretching away one behind another till our sight fails. That speck of light which anyone may see is a sample of one of these islands; it is a world not only remote in space but remote in time. Long before the dawn of history the light now entering our eyes started on its journey across the great gulf between the islands. When you look at it you are looking back 900,000 years into the past.

Amid this profusion of worlds and space and time, where do we come in? Our home, the Earth, is the fifth or sixth largest planet belonging to an inconspicuous middle-grade star in one of the numerous islands of the archipelago. Doubtless there are other globes which are

or have been tenanted by beings of similar nature to ourselves ; but we have some reason to think that such globes are uncommon. It seems that normally matter collects in big lumps with terrifically high temperature ; the formation of small cool globes fit for habitation is no part of the normal scheme, though it has happened occasionally by a rare accident. Nature seems to have been intent on a vast scheme of evolution of fiery globes, an epic of milliards of years. As for Man—that was an unfortunate incident which it seems rather ungenerous to refer to. It was only a trifling hitch in the machinery—not of very serious consequence to the universe. No need to be always raking up against Nature her one little inadvertence.

Is that how you and I come in ? To realise the insignificance of our race amid the majesty of the universe is probably healthful. But it brings to us a more alarming thought. For Man is the typical custodian of certain qualities or illusions which make a great difference to the significance of things. He displays purpose in an inorganic world of chance. He *can* represent truth, righteousness, sacrifice. In him there flickers for a few brief years a spark from the divine spirit. Are these as insignificant as he is ?

It may possibly be going too far to say that our bodies are pieces of stellar matter which by a contingency not sufficiently guarded against have taken advantage of the low temperature to assume unusual complication and perform the series of strange antics we call ' life '. But I do not combat this view ; even if I doubt its tenability, I keep an open mind, and am unwilling to base philosophy or religion on the assumption that it must necessarily break down. But alongside this there is another outlook.

Science is an attempt to set in order the facts of experience. Everyone will agree that it has met with wonderful success ; and the picture which it draws of the physical universe is its answer to the problem. But it does not start quite at the beginning of the Problem of Experience. The first question asked about facts or theories such as I have been describing is 'Are they true?'. I want to emphasise that even more significant than the astronomical results themselves is the fact that this question about them so urgently arises. The question 'Is it true?' changes the complexion of the world of experience—not because it is asked *about* the world but because it is asked *in* the world. If we go right back to the beginning the first thing we must recognise in the world is something intent on truth—something to which it matters intensely that belief should be true. We settle that as the first ingredient of the world of experience, before we invite science to take the problem in hand and put in order other facts of experience. If in its survey of the universe science rediscovers the presence of such an ingredient, well and good ; if not the ingredient remains none the less essential, for otherwise the whole quest is stultified.

What is the truth about ourselves ? We may incline to various answers. We are a bit of a star gone wrong. We are complicated physical machinery—puppets that strut and talk and laugh and die as the hand of time turns the handle beneath. But let us remember that there is one elementary inescapable answer. We are *that which asks the question*. Responsibility towards truth is an attribute of our nature. It is through our spiritual nature, of which responsibility for truth is a typical manifestation, that we first come into the world of experience ; our entry via the

physical universe is a re-entry. The strange association of soul and body—of responsibility for truth with a bit of stellar matter that got cold by accident—is a problem in which we cannot but feel intense interest, but not an anxious interest as though the existence and significance of a spiritual side of experience were hanging in the balance. The solution must fit the data ; we cannot alter the data to fit the alleged solution.

I do not regard the phenomenon of living matter (in so far as it can be treated apart from the phenomenon of consciousness) as necessarily outside the scope of physics and chemistry. Arguments that, because a living creature is an organism, it *ipso facto* possesses something which can never be understood in terms of physical science, do not impress me. I think it is insufficiently recognised that modern theoretical physics is very much concerned with the study of organisation ; and from organisation to organism does not seem an impossible stride. It may happen that some day science will be able to show how from the entities of physics creatures might have been formed which are counterparts of ourselves even to the point of being endowed with life. The scientist will perhaps point out the nervous mechanism of this creature, its powers of motion, of growth, of reproduction, and end by saying ' That's you '. But remember the inescapable test. ' Is it concerned with truth as I am ; then I will acknowledge that it is indeed myself.' We demand something more even than consciousness. The scientist might point to motions in the brain and say that these really mean sensations, emotions, thoughts ; and perhaps supply a code to translate the motions into corresponding thoughts. Even if we accept this rather inadequate substitute for consciousness as we intimately

know it, we must still protest : ' You have shown us a creature which thinks and believes ; you have not shown us a creature to whom it *matters* (in any non-utilitarian sense) what it thinks and believes.' The inmost ego, possessing what I have called the inescapable attribute, can never be part of the physical world unless we alter the meaning of the word ' physical ' to ' spiritual '—a change hardly to the advantage of clear thinking. But having disowned our supposed double, we can say to the scientist : ' If you will hand over this Robot who pretends to be me, and let it be filled with the attribute at present lacking and perhaps other spiritual attributes which I claim on similar though less indisputable grounds, we may arrive at something that is indeed myself.'

An interesting point is that the recent revolutionary changes of science have made this kind of co-operative solution of the Problem of Experience more practicable than it used to be. A few years ago the suggestion of taking the physically constructed man and adapting him to a spiritual nature by casually adding something, would have been a mere figure of speech—a verbal gliding over of insuperable difficulties. In much the same way we talk loosely of building a Robot and then breathing life into him. A Robot is presumably not constructed to bear such last-minute changes of design ; he is a delicate piece of mechanism designed to work mechanically, and to adapt him for anything else would involve wholesale reconstruction. To put it crudely, if you want to fill a vessel with anything you must make it hollow, and the old-fashioned material body was not hollow enough to be a receptacle of spiritual nature. I know that the change in our conception of the material universe and of the aims of physics must be very puzzling to most people ; but I

have not time to explain or defend it. I will only say that any of the young theoretical physicists of to-day will tell you that what he is dragging to light as the basis of all the phenomena that come within his province is a scheme of symbols connected by mathematical equations. That is what the physical universe boils down into, when probed by the methods which a physicist can apply. Now a skeleton scheme of symbols is hollow enough to hold anything. It can be—nay it cries out to be—filled with something to transform it from skeleton into being, from shadow into actuality from symbols into the interpretation of the symbols. And if ever the scientist solves the problem of the living body, he should no longer be tempted to point to his result and say ‘That’s you’. He will say rather: ‘That is how I symbolise you in my description and explanation of those of your properties which I can observe and measure. If you claim any deeper insight into your own nature—any knowledge of what it really is that these symbols symbolise—you can rest assured that I have no rival interpretation of the symbols to propose.’ The skeleton is the whole contribution of physics to the solution of the Problem of Experience; from the clothing of the skeleton it stands aloof.

I think we may say that, although the physicist has carried his work to greater perfection than formerly, he now puts it in a form which does not hide its incompleteness. Implicitly, if not explicitly, he advertises for someone to complete it. And we who are interested in the non-material aspects of experience are not butting in; we are answering his advertisement. But, of course, it does not follow that general opinion among physicists regards us as suitable applicants for the job; I admit that

there are many who would say that it is better to let sound work remain uncompleted than to let it be embellished by incompetent workmen as they deem us to be.

The scientific conception of the world has come to differ more and more from the commonplace conception, until we have been forced to ask ourselves what really is the aim of this scientific transformation. The doctrine that 'things are not what they seem' is all very well in moderation; but it has proceeded so far that we have to remind ourselves that the world of appearances is the one we have actually to adjust our lives to. That was not always so. At first the progress of scientific thought consisted in correcting gross errors in the commonplace outlook. We learned that the earth was spherical, not flat. That does not refer to some abstract scientific earth, but to the earth we know so well with all its colour, beauty and homeliness. I confess that when I think of a Test Match in Australia I cannot help picturing it as played upside down—so much has the roundness of the earth become part of a familiar outlook. We learned that the earth was rotating. For the most part we give an intellectual assent to this without attempting to weave it into our familiar conception, but we can picture it if we try. In Rossetti's poem the Blessed Damosel looked down from the golden balcony of Heaven through

The void as low as where this earth
Spins like a fretful midge.

Looking from the abode of truth, perfect truth alone can enter her mind. She must see the earth as it really is—like a whirling insect. But now let us try something fairly modern. In Einstein's theory the earth, like other matter, is a curvature of space-time, and what we

commonly call the spin of the earth is a ratio of two of the components of curvature. What is the Blessed Damosel going to make of that? I am afraid she will have to be a bit of a blue-stockings. Perhaps there is no great harm in that. I am not sure that I would think it derogatory to an angel to accuse him of understanding Einstein's theory. My objection is more serious. If the Blessed Damosel sees the earth in the Einsteinian way she will be seeing truly—I can feel little doubt as to that—but she will be *missing the point*. It is as though we took her to a picture gallery, and she (with that painful truthfulness which cannot recognise anything that is not really there) saw ten square yards of yellow paint, five of crimson, and so on.

So long as physics in tinkering with the familiar world was able to retain those aspects which appeal to the æsthetic side of our nature, it might with some show of reason claim to cover the whole of experience ; and those who claimed that there was another, religious aspect of experience had to fight for their claim. But now that its picture omits so much that is obviously essential, there is no suggestion that it is the whole truth about experience. To make such a claim would bring protest not only from those religiously inclined but from all who recognise that man is not merely a scientific measuring machine. If it were necessary I would at this point turn aside to defend the scientist for pursuing the development of a highly specialised solution of one side of the Problem of Experience and ignoring the rest ; but I will content myself with reminding you that it is through his efforts in this direction that my voice is now being heard by you. At any rate there is method in his madness.

Another striking change of scientific views is in regard

to determinism—the view that the future is predestined, and that Time merely turns over the leaves of a story that is already written—

Yea the first Morning of Creation wrote
What the last Dawn of Reckoning shall read.

Until recently this was almost universally accepted as the teaching of science—at least in regard to the material universe. It is the distinctive principle of the mechanistic outlook which superseded the crude materialistic outlook. But to-day physical theory is not mechanistic, and it is built on a foundation which knows nothing of this supposed determinism. So far as we have yet gone in our probing of the material universe, we find no evidence in favour of determinism. The new theory recognises a wide domain of phenomena in which the future is for all practical purposes definitely predictable, and explains why this is possible ; but it does not assume the same predictability for all physical phenomena. According to the type of phenomenon studied, forecasts of the future have different degrees of probability ranging from overwhelming odds to even chances. The denial of determinism is not merely qualitative but quantitative ; we have actually a mathematical formula indicating just how far the course of events deviates from complete predictability.

I do not think there is any serious division of opinion as to the deace of determinism. If there is a division among scientists it is between the mourners and the jubilants. The mourners naturally hope that determinism will one day be re-established in its old position in physics ; that is possible, but personally I see no reason to expect that it will return in any shape or form. In

any case, our concern is not with prophetic anticipations of what science may be like in future. but with the relations between present-day science and religion. To discuss the extent and consequences of this change would lead to questions too technical to be dealt with here. (To avoid possible misunderstanding I had better say that I do not think it makes any important difference to special theological questions such as miracle, or 'direct answer' to prayer.) But I think there is no longer any need to doubt our intuition of free will. Our minds are not merely registering a predetermined sequence of thoughts and decisions. Our purposes, our volitions are genuine ; and ours is the responsibility for what ensues from them. It seems necessary to admit this, for we are scarcely likely to accept a theory which would make the human spirit *more* mechanistic than the physical universe.

I now turn to the question, what must be put into the skeleton scheme of symbols. I have said that physical science stands aloof from this transmutation, and if I say anything positive on this side of the question it is not as a scientist that I claim to speak.

It was by looking into our own nature that we revealed the first failure of the physical universe to be co-extensive with our experience of reality. The 'something to which truth matters' must surely have a place in reality, if we are to use the term reality at all. In our own nature, or through the contact of our consciousness with a nature transcending ours, there are other things that claim the same kind of recognition—a sense of beauty, of morality, and finally at the root of all spiritual religion an experience which we describe as the presence of God. In suggesting that these things constitute a spiritual world I am not trying to substantialise them or objectivise them—to

make them out other than we find them to be in our experience of them. But I would say that when from the human heart, perplexed with the mystery of existence, the cry goes up, 'What is it all about?', it is no true answer to look only at that part of experience which comes to us through certain sensory organs and reply: 'It is about atoms and chaos; it is about a universe of fiery globes rolling on to impending doom; it is about tensors and non-commutative algebra'. Rather it is about a spirit within which truth has its shrine, with potentialities of self-fulfilment in its response to beauty and right. Shall I not also add that even as light and colour and sound come into our minds from a world beyond, so these other stirrings of consciousness come from something which, whether we describe it as beyond or deep within ourselves, is wider than our own individual personality?

It is the essence of religion that it presents this side of experience as a matter of everyday life. To live in it, we have to grasp it in the form of familiar recognition and not as a series of abstract scientific statements. Its counterpart in our outward life is the familiar world and not the symbolic scientific universe. The man who commonly spoke of his ordinary surroundings in scientific language would be insufferable; and if God really has a part in our everyday life, I do not think we need mind if the critic trips us up for speaking and thinking of him unscientifically.

But perhaps the earnest Christian will say: 'I am a plain man and I think of God unscientifically, as you allow. It means a great deal to me to conceive God as the Father, from whom comes power and guidance and to whom I may turn with devotion and trust. But just because it means so much, I have no use for it if it is only

a convenient fiction which will not stand close examination. Can you not give some assurance that there is such a God in reality, and that belief in him is not merely a sop to my limited understanding ? ' The fear is that when we come to analyse that which we call religious experience, we shall find that the God apparently revealed in it is merely a personification of certain abstract principles. Now I frankly admit that the application of any method which we should call scientific to the examination of our religious experience is likely to work this kind of havoc. But what else could we expect ? Although the method of physical science is inapplicable, the methods of the less exact sciences which are to some extent modelled on it may perhaps be applied. They involve the same kind of abstraction and codifying. If our treatment consists in codifying, what can we possibly get but a code ? The fact that scientific method seems to reduce God to something like an ethical code may throw some light on the nature of scientific method ; I doubt if it throws much light on the nature of God. If the consideration of religious experience in the light of psychology seems to remove from the conception of God every attribute that calls forth our worship or love, it is pertinent to consider whether something of the same sort has not happened to our human friends after psychology has systematised and scheduled them. It does not fall within my scope to give the questioner the assurance he desires ; I doubt whether there is any assurance to be obtained except through the power of the religious experience itself ; but I bid him hold fast to his own intimate knowledge of the nature of that experience. I think that that will take him closer to the ultimate truth than codifying and symbolising can reach.

I know that my writings have disappointed many because I set aside the question, Is God an objective reality? Before attempting to answer it it would be necessary to catechise the questioner as to what meaning—if any—he associates with the word objective. I do not think that it is possible to make the same hard and fast distinction between subjective and objective that we used to make. The theory of relativity has taught us that the subjective element in our experience of the physical universe is far stronger than we had previously suspected. It is true that in relativity theory we continue our attempt to reach purely objective truth. But what results? A world so abstract that only a mathematical symbol could inhabit it. In the other great modern development of physics—the quantum theory—we have, if I am not mistaken, abandoned the aim, and become content to analyse the physical universe into ultimate elements which are frankly subjective. If it is difficult to separate out the subjective element in our knowledge of the external world, it must be much more difficult to distinguish it when we come to the problem of a self-knowing consciousness, where subject and object—that which knows and that which is known—are one and the same.

I have been laying great stress on *experience*; in this I am following the dictates of modern physics. But I do not wish to imply that every experience is to be taken at face value. There is such a thing as illusion, and we must try not to be deceived. In any attempt to go deeply into the meaning of religious experience we are confronted by the difficult problem of how to detect and eliminate illusion and self-deception. I recognise that the problem exists, but I must excuse myself from

attempting a solution. The operation of cutting out illusion in the spiritual domain requires a delicate surgical knife ; and the only instrument that I, a physicist, can manipulate is a bludgeon which, it is true, crushes illusion, but at the same time crushes everything of non-material significance and even reduces the material world to a state of uncreatedness. For I am convinced that if in physics we pursued to the bitter end our attempt to reach purely objective reality, we should simply undo the work of creation and present the world as we might conceive it to have been before the Spirit moved upon the face of the waters. The spiritual element in our experience is the creative element, and if we remove it as we have tried to do in physics on the ground that it also creates illusion, we must ultimately reach the nothingness which was in the Beginning.

Reasoning is our great ally in the quest for truth. But reasoning can only start from premises ; and at the beginning of the argument we must always come back to innate convictions. There are such convictions at the base even of physical science. We are helpless unless we admit also (as perhaps the strongest conviction of all) that we have within us some power of self-criticism to test the validity of our own convictions. The power is not infallible, that is to say it is not infallible when associated with human frailty ; but neither is reasoning infallible when practised by our blundering intelligence. I think that this power can be nothing less than a ray proceeding from the light of absolute Truth, a thought proceeding from the absolute Mind. With this guidance we may embark on the adventure of spiritual life uncharted though it be. It is sufficient that we carry a compass.

X

PROFESSOR S. ALEXANDER, O.M., F.B.A.

SCIENCE and religion have drawn noticeably nearer to each other in this century than they were even in the last twenty years of the last century, when I was still a young man. On the one hand science, and particularly physical science which is the furthest advanced of the sciences, has begun to think that matter and spirit may not be so far removed from each other as was supposed, and has grown tolerant of the claims of religion to stand for something real in the world. On the other hand religion has to a certain extent moved towards science by abandoning some of its stricter pretensions and modifying some articles of its beliefs, though the change on the side of religion, always a very conservative thing, has not been so marked as on that of science. But in speaking of the changed attitude of science, I used the word 'tolerance' advisedly, for science even now is rather tolerant of religion than comprehensive of it. It does not so much open arms of welcome to religion, as rather it is content to admit that religious belief may be well-founded though physical science is not concerned with it. There are remarkable exceptions to this attitude of merely friendly recognition, for some men of science, like my immediate predecessor in this discussion, are forward to maintain that in the end mind and even the object of religious feeling are the most directly known realities; that we know our minds and know God in our lives, while physical reality we do not know and only approach by symbolical constructions. I shall have something to say about this

attitude later on. But in general we have in the more common scientific view religion and nature left side by side without having much to do with one another, only not antagonistic to each other. Now what I want to say is that the object of religion is the completion of the one and the same world of things of which physical nature is another part, and consequently that religion has no call modestly to urge that spirit and God count for something in the world, but rather that a scientifically-minded person needs to recognise religion in order to have a satisfactory view of the world.

I am joining in this discussion as a philosopher, and a philosopher is never happy unless he can fit the subject he is speaking about into its place in some scheme of things, and consequently I do not find I can rest in the notion that nature and the object of religious feeling can be left side by side without an attempt to show their connection ; and this is what I propose to do. Of course, I do not mean merely that there is a science of religion, in the sense that one science, psychology, analyses the nature of religious feeling, and that another science, comparative religion, treats of the different sorts of religious beliefs. The question for a philosopher is whether this feeling has any foundation in reality, whether religion may not be all a fancy, as undoubtedly many of the religious beliefs entertained by men are fanciful. And, of course, I take science in its widest sense of organised knowledge, and I do not mean that religion is a matter for physical science or mathematics or biology or even psychology. I mean only that it has its appropriate knowledge and that that knowledge is part of the whole system of knowledge. The knowledge of God may be very unlike other forms of knowledge, and very imperfect. But so also is biology

very unlike physics, and very imperfect as compared with it or with mathematics.

I suggest that there are two ways in which belief in God is removed from being mere guesswork. One of the elements of religious feeling is the sense of mystery, of something which may terrify us or may support us in our helplessness, but at any rate which is other than anything we know by our senses or our reflection. And it is natural to believe that there is something real, some feature of actual existence, which calls forth this sentiment in us. Mr Otto calls this the 'numinous' element in the world, inventing a happy word from the Latin word *numen* which means divinity. It takes all manner of forms in our beliefs, attaching itself to the various objects man worships, from fetish to divine creator. Mr Otto thinks that this numinous element is rationalised in the various religions into their creeds, and, naturally enough, he, being a theologian in a Christian University, thinks that it is best or uniquely rationalised in Christianity. That is a secondary matter; but in recognising the existence in real fact of this numinous element in the world, I follow him, and though in no way concerned with Turkey or the Moslem religion profess myself in this respect an Ottoman. But I do not in the least mean that there is some rare specific quality in things which we can discover, which is the numinous, which is the object of religious feeling as frost can be felt by our sense of cold. On the contrary, I should say we have no organ which enables us to apprehend the numinous, and that many persons do not have the religious feeling at all, or only (like myself) occasionally, just as some persons have no ear for music, and that so far from its being something exalted or utterly inexplicable, it is allied to very familiar feelings, like the

sensitiveness to barometric conditions which many people have, that uneasiness which some people feel in changes of the weather which Dr Johnson regarded with such contempt. It may partially be accounted for in many ways, but when all is known there remains this mysterious somewhat in nature. I am inclined to think it means the way in which we with our bodies respond to the world as a whole, instead of to the particular parts we get to know by the senses, that the world, as it were, takes us all of a heap, and we respond in this vague sense of mystery.

If it stood alone, it would be a very insufficient basis for a belief that nature herself indicates the existence of deity. Taken by itself merely as a common or even universal experience of ordinary man, it is impressive enough, because it claims to be a fact of such experience. Yet, like other things claimed for facts, it might be open to a new interpretation and conceivably might be explained away. But it does not stand alone: it is confirmed by the sciences themselves. For when we take a large view of knowledge as a whole, we find that knowledge, science that is to say, points to something *in nature* beyond what is already known in nature. In nature we have different grades or levels of existence which are studied respectively by the various sciences. The physical sciences study matter or material bodies, or rather things in their material characters; and it is well known that such knowledge extends downwards to forms of existence which cannot even be called material, but only sub-material, such, for instance, as light or electrons. Biology studies plant life and animal life; and psychology mind or mental behaviour. Moreover, these levels of existence grow out of each other. Let us suppose for simplicity that there are three such levels, those of material bodies, of

living bodies and of conscious beings, distinguished respectively by their fundamental features of materiality, life and mind.

Now these levels of existence grow up in the order of time, in a series or history. The world of things is through and through an historical world, for history begins not with man but with the stars and perhaps earlier. Now this growth is one of what, since Mr Lloyd Morgan introduced or reintroduced the idea and the term, is called emergence. Life emerges from matter and mind from life. A living being is also a material being, but one so fashioned as to exhibit a new quality which is life. It is an open question whether the facts of life can ultimately be expressed in terms of physical and chemical laws. In a previous paper in this discussion, Mr Haldane has said, emphatically, No. I am not concerned to enter upon such a discussion, for which I am incompetent. It is enough for me to indicate that a living body, if it is also a material one—and I confess I believe thoroughly material—is of so complicated or highly fashioned a nature as to be alive and to possess a quality which a merely material body does not possess. And the same thing may be said of the transition from life to mind. A ‘minded’ being is also a living being, but one of such complexity of development, so finely organised in certain of its parts, and particularly in its nervous system, as to carry mind—or, if you please to use the word, consciousness.

Now the point is this. Nature is historical, and grows so as to present in time a series of emergent qualities of which mind is the highest that we know from direct experience of ourselves or of other selves. Why should this process stop? The mere outgrowth of life from

matter and mind from life, each quality resting upon a body characterised by the distinctive quality of the lower level of existence, suggests a further quality of existence beyond mind, which is related to mind as mind to life or life to matter. That quality I call deity, and the being which possesses it is God. It seems to me, therefore, that all things point to the emergence of this quality, and that is why I said that science, itself, when it takes the wider view, requires deity.

These two ways of approaching deity are not disconnected. What I suggest is that the numinous element, which as a matter of fact we feel to be present in nature, is not deity itself, but the adumbration of it ; that the world we know, and study in the separate sciences in its parts, exhibits also a tendency, an actually existing tendency, in the whole towards the emergence of deity. Thus the two kinds of evidence confirm each other, and we are led to the notion that the world is a world striving or tending to deity, and that it has in this sense a divine character. Such a conception is not pantheism ; according to it the world is not animated by deity as pantheists believe, for deity has not in its distinctive nature as yet emerged at this stage of the world's existence. It merely regards the world as owing such divine character as it has to its *nisus* or striving towards a higher form of life. If you ask me what God is, I can only answer he is a being whose body is the whole world of nature, but that world conceived as actually possessing deity, and therefore he is not actual as an existent but as an ideal, and only existent in so far as the tendency towards his distinctive character is existent in the actual world. Religion is in this way justified of science herself. The God who is the object of religious feeling is not a fancy embodied under some

mood of excitement, but has its basis in solid fact and in the general nature of things.

I ought to add something to explain why I do not follow Sir Arthur Eddington, who goes beyond anything that I say because he holds God and mind to be more directly known than physical things, and even thinks that mind which we know directly must be treated as the ultimate character of things. I do not refer specially to what he said last week but am proceeding on the strength of what I know of his elsewhere. I should like to believe his conclusions, but I think he gives the wrong reasons for them. I have to be short, but I hope to be clear. In the first place I do not think it is true that we know our minds directly while physical things we know only indirectly, for I never am aware of myself except as I am also aware of physical things outside my body, or, in my more personal experiences, of my own body. Mind has, I think, no such superiority over physical things as he alleges. And next, so far as concerns God, he almost inevitably assigns God to a department of experience shut off from the ordinary physical experience. In the beautiful Quaker fashion, he trusts to the witness of God in ourselves and the light of nature. But what guarantee have we that that light may not be a wandering fire? The light of nature cannot be its own guarantee. It needs confirmation from the accordance of its deliverances with the whole of our experience. That is why I have tried to supply some such justification.

But you will at once object that my account or justification of religion would not be accepted by any known religion past or present. God, you will say, is on this showing an ideal being, whose deity does not yet exist, but is the next quality due to emerge, and cannot

therefore be known by us. He exists only in the striving of the world to realise his deity, to help it as it were to the birth. Moreover, he is not a creator as in historical religions, but created. And for most of us God's nature is a superior human nature, and besides his attribute of love there is his goodness of which nothing is said. And what becomes of all our creeds and our theologies, and how can we worship or love a God not realised but still to come ?

• Well, I think these questions are hard to answer, but I must do my best to answer them in the time I have left. I will take the questions in the reverse order. It seems to me more reasonable (and helpful) to worship a being, whose love draws us to him from in front, and whom we thus help into existence, rather than a being independent of our efforts, who pushes us from behind. We are creating something over which we have control rather than just obeying something we have to recognise. In the next place, I observe that deity, growing as it does out of mind, and in particular the highest mind we know, presupposes mind and all its creations of knowledge and goodness and beauty, just as mind presupposes and grows out of life and matter, and whatever may lie below these. God is not a symbol of the goodness in the world, but does presuppose goodness. Deity is a quality distinct from and superior to goodness or beauty or truth. I can be enthusiastic for beauty or truth, but I have no worship for them. They excite in me no religious feeling, though in many persons they may supply the place of religion, where no religion is felt. The mystics are right ; we worship or love in God, not his goodness, but his godship or deity.

Finally, I plead only that I have indicated where and

how the sentiment of God finds its justification in a considered scheme of things, to which the sciences belong. I account for the existence and the validity of religious feeling under whatever concealments it may lurk, in any individual or in every religion. And then I plead that religion is only one part of the human make-up, and the special form it assumes varies according to the rest of our ideas, and more particularly according to the limitations of our minds. For we do not in general proceed rationally or think in abstract forms, but are creatures of imagination. A vague and difficult idea like that which underlies deity assumes forms familiar from our ordinary experience or suitable to the range of our imaginative life. It is small wonder that a creator who makes his creatures and sways their lives by his ordinances is easier and more natural to our workaday minds than such a being as has been suggested here, with all the difficulties attaching to it, which I should be the last person to disallow. We shadow forth our abstracter thoughts in the most accessible images and overlook their weaknesses, leaving them rather to provoke in our theologies whole volumes of controversy spent on the insuperable task of giving rational form to imaginative creations. Moreover, though religion is a specific impulse or sentiment, no mere derivative of other sentiments like that of love or goodness or beauty, yet religion, as is notorious, grows up not alone, and in severance from other human interests, but as one shoot of the tree of human experience, and is intimately intertwined with the customs of men, so that its forms are never dissociated from the prevailing practice of its time. Hence the barbarity and childishness that may disfigure the practice of religious rites ; and its confusion with magic, from which it may not wholly yet have risen free.

Hence it is that religion, partly because it needs images of that which is not imaginable, and partly because it craves fixity in its ideas, is the prey of mythologies and of creeds, and the more it becomes institutional, as it must (even if men are only 'congregated', in Burke's phrase, 'in the sanctuary of the heart', 'in that personal capacity') the more deeply these mythologies and creeds become rooted in the mind. Hardly any religion divests itself of mythology, and the more beautiful the mythology is, like that of Christianity, the harder such divestment is. Possibly if we could confine ourselves to the actual words of the last of the great Hebrew prophets, Jesus, we should have the nearest approach to it—before Paul reduced Christianity to a system of religious thought. Theology intervenes to satisfy the rational mind of man with reasoned justifications of what it has taken over from actual faith, and in doing so no doubt it renders a great service to thought, attempting as it does to illuminate religion by the current notions of philosophy. But at the same time it imposes upon religion itself a mass of learning and tradition which are apt to stifle the mind of man in its effort after simplicity in its religious statements. Religions come thus to be choked by their own overgrowth of plants which draw their life from the religion, but may surround its central feeling with a paling which may shut out direct vision. And so in our time it is not so much religion which fails, as the forms of it which are unadapted to our needs. Some simplification of our religious notions, which may be a fresh creation or may be only a renaissance, but at least a simplification, is needed in our day which will not repel the religious mind from the outset with beliefs which he finds incongruous to the rest of his mental stock, and

positively will accord with the aspirations of the present-day mind ; failing which the room is open to superstition and allegory, however seductive. Such a simplification will not come from theologians nor from philosophers, but if at all from some simple-minded but profound religious genius sensitive to future needs. Even it will have its mythology in order to be humanly accessible, but its mythology will be credible to the men of to-day.

XI

THE VERY REV W. R. INGE

Dean of St Paul's

THOSE who have followed this discussion must have been struck by the courtesy with which it has been conducted. There is plenty of rudeness still, if we know where to look for it—for example in the pulpits of Tennessee, and on some rationalist platforms nearer home. But this style of controversy is now left to the half-educated. Our discussion has moved on a high plane.

The danger now is that both sides may be a little too polite. 'There is no longer', we are told, 'any conflict between religion and science'. If by religion we mean theology, and if by science we mean naturalism, this is not true. Theology and naturalism are both theories about ultimate reality. They are both inveterate poachers; theology cannot be content with religion, nor naturalism with science; and when they meet on each other's ground, or on no-man's-land, they are likely to fight.

It is easy to say, 'Let them cease to poach. Render to religion the things which are religion's, and to science the things which are science's'. To this way of thinking belong all such bisections of the field of experience as those which oppose sharply to each other fact and value, reality and appearance, the knowable and the unknowable, the visible and the invisible, prose and poetry. But this solution can commend itself only to those who do all their serious thinking in one field, and do not want to be worried about any other. To the physicist and mathematician, reality is that which can be measured and

counted. Above this real world of his, and not affecting it at all, floats, like a luminous haze, the ideal world of values—the world of art, philosophy, and religion. On the other hand, to the idealistic philosopher, thought alone is real. The external world has no reality except as presented to our consciousness. The religious mystic says with Augustine, ' I desire to know two things only, my own soul and God '.

These different types of men are all specialists in some one abstract field of knowledge. If they mentally construct a world out of the materials of their own studies, it will be a very imperfect picture of reality. The physicist or mathematician, if he is only a physicist or mathematician, will have to leave out all that gives life its value, and he will be quite unable to account for himself, the thinker, a stubborn, solid object who can neither be explained nor explained away. The idealist will have to deny the plain verdict of our consciousness, that when I see my friend, or my house, I do not imagine him, or make him or put him there ; he is objectively present, independently of whether I see him or not. And the mystic who wishes to know nothing except himself and God will find that both are empty of content.

No, this demarcation of territory will not work. We are conscious of facts, and we are conscious of values. But a fact which has no value is not a fact, and a value which is not a fact has no value. A religion which does not touch science, and a science which does not touch religion, are mutilated and barren. I do not say that science can ever be a religion, or religion a science. The most we can hope for, and it is not beyond hope, is that the science of a religious man may be scientific, and the religion of a scientific man religious.

The last fifty years have done much to clear away a mass of false science from religion and many obstacles to religion from science. Let me take these two points one after the other.

Christian dogma congealed and crystallised in an age when science, which the Greeks had developed most creditably without any of our modern mechanical aids, was almost dead. The average man really believed that the universe is a building in three storeys, heaven, earth and hell ; that the world was created four thousand years before Christ, and was nearing its end ; that the interventions of God in human affairs are catastrophic, not evolutionary ; that miracles are of everyday occurrence ; that everything which it really concerns us to know was revealed in the apostolic age ; and that the priesthood held the keys of heaven and hell.

Science came to life again at the Renaissance, and the opposition of the Church might have been overcome, but for the terrible Wars of Religion which followed the Reformation. Both sides entrenched themselves behind infallible authorities ; both denounced the new knowledge ; a cleft yawned between religion and science such as had not been seen before. It has not yet been fully closed.

Within the last hundred years the advance of science has been bewilderingly rapid ; but the Church has learned its lesson, and has lightened the ship by throwing over many antiquated traditions, and the educated Christian has accepted Copernicus and Galileo and Newton ; he has accepted Darwin ; he has accepted Jeans and Eddington ; he is prepared to accept Einstein if he could understand him. He has surrendered the geographical heaven and hell, perhaps without fully realising all that

that surrender implies. He accepts the ascent of man from lower forms ; the immense age of the earth ; the even more amazing vista which astronomers allow us to contemplate in the future ; he has discarded miracle as a fact of present experience, and he has assimilated the idea of slow evolutionary change.

This looks like a fairly comprehensive surrender, if we remember what passed for orthodoxy a hundred or even fifty years ago. It would have been hailed as a complete surrender by Thomas Huxley and his contemporaries. Those doughty champions of the right of science to be queen in her own domain had so much right on their side, and ultimately did so much good to religion by driving it back on its real defences, that it may seem ungrateful to accuse them of dogmatism and intolerance, the very vices they were attacking. The word 'dogma' is curiously unpopular. Any stigma is good enough to beat a dogma. Mr Arnold Bennett, in the best nineteenth-century manner, says: 'In my opinion it is absolutely impossible for a young man with a first-class intellectual apparatus to accept any form of dogma. It is impossible in one's private thoughts, to think of the acceptor of dogmas as an intellectual equal'. But a dogma only means something which has been decided upon and accepted. It has no necessary connection with religion. It is a dogma of science that the earth goes round the sun. And the Victorian scientists were extremely dogmatic about several things that are now known or suspected not to be true.

England is the country of amateurs, and the Victorian age produced some brilliant free-lances who dared to question the dogmas of science. Two of Darwin's most penetrating critics were the Roman Catholic Mivart and

Samuel Butler. The hierarchs of science treated them as beneath contempt. Meanwhile the theologians were defending themselves, very clumsily, it is true, but at bottom their objections to naturalism were valid.

What were the things which the champions of religion refused to give up? They stuck to the belief in a rational purpose in creation; they would not believe that Shakespeare and Newton were the product of a blind dance of molecules. They insisted that the kingdom of values is at least as real as the kingdom of facts. They believed in an author of the universe who, for want of an adequate word, must be called personal. They believed that this God is eternal, above the flux of time, and that the human spirit also has a footing in the eternal world. They rejected determinism, and maintained that in some sense the human will is free, as we all know it to be. (There is, however, a newspaper called the *Freethinker*, which exists partly to deny with vehemence the possibility of free thinking.)

These beliefs are not the whole of Christianity, but they are essential parts of it, and these are the beliefs which nineteenth-century naturalism declared that we have no right to hold. I wish to examine, as well as I can here, what were the presuppositions which led the Victorian scientists to brand these beliefs as contrary to science, and what has become of these presuppositions.

Evolution is a very popular catchword. It is just these popular catchwords which need to be watched very carefully, for they are a shifty lot. 'Evolution' was constructed to deny the implication of *novelty* in nature. Nothing can be evolved (unrolled) except what had been involved (rolled up) from the beginning. This assumption was used as a theory of descent. But the optimism!

or vanity, of our grandfathers assumed further that the process which had produced themselves was an upward trend, a progress towards perfection, which for some odd reason they associated with increasing complexity of structure. Thus the idea of change, which the word 'evolution' had been coined to deny, was asserted to be the essence of evolution, and, more boldly still, the improvement which they complacently traced in the evolution of man from a lower animal, was assumed to be a law of the universe in general. This assumption is, of course, what theologians call an act of faith. There are no signs of progress except in one species on one planet, and in that exceptional case we only call it progress because it has produced our noble selves. But by a circular argument, whatever evolution leads to, even in the heating or cooling of a star, was called progress.

The dogma of mechanical science is that nothing true can be new, and nothing new can be true. Evolution is merely unpacking of what was there all the time. There is, therefore, no such thing as change. But manifestly there are changes. Darwin tried to get over the contradiction by saying that the changes are very small, so slow as to be almost imperceptible—much as a girl excused the appearance of a baby which needed explanation by saying that it was a very small one. But the problem of change cannot be got rid of in this way.

If there is real change, there must be something in the later stages which was not there, even implicitly, in the earlier. Where did that something come from? There is a warm controversy on this subject among men of science. Some, like Professors John Haldane and Lloyd Morgan, think that life and mind cannot be explained by the laws which regulate inanimate matter. I hope they

are right ; but I am afraid phrases like ' emergent evolution ' only cover up an attempt to assert and deny change in the same breath. ' Emergence ' explains nothing.

Darwin's theory of natural selection meets with some rough handling now. It may explain the survival of new types ; it certainly cannot explain their arrival. And the notion that a species is evolved blindly and fortuitously could only be accepted when it was rammed down our throats.

But the entire baselessness of the optimistic theory of evolution, as held by Herbert Spencer and even by Darwin himself, becomes still more obvious when we consider another fact, which was known as well in the last century as it is to-day. We were invited to regard the universe as a process. A whole school of philosophy taught that God is Himself evolving in the world which is his life-history. Are things not very well managed now ? Give Him time, and He will work out the sum admirably. * And all the time, their own science was proclaiming that the universe is indeed a process, but a process in the wrong direction. According to the Second Law of Thermodynamics, from which our astronomers and physicists reluctantly confess that they can see no escape, the whole universe is slowly but surely running down like a clock. According to the newest theory, the stars are stoked by the destruction of their substance. Matter is steadily disappearing in radiation.

I know no stronger instance of the power of men to shut their eyes to an unwelcome conclusion. This law ought to have killed the belief in unending automatic progress, but it did not. It ought also to have been plain that there is a flat contradiction between the belief that the universe is running down like a clock, and the

dogmatic denial of creation in time. For a clock that is running down must have been wound up, and presumably by an intelligent person, who had probably made the clock himself.

There are, of course, ways of escaping the pessimistic conclusion forced upon us by the Second Law of Thermodynamics. We may say that whatever Power wound up the clock once may, and probably will, wind it up again. Some physicists are trying hard to find a recuperative principle now at work in nature. Professor Millikan, the American, thinks that he has found it in the 'cosmic rays', which seem to proceed from the intense cold of interstellar space. Here, he thinks, at a genial temperature of minus 273 Centigrade, the electrons which were broken up in the furnaces of the stars may recombine and form hydrogen atoms. I rather hope he will prove his case, but I do not think he has made many converts yet.

You must not misunderstand me about human progress. There is no law of progress, and there is no universal progress. At some almost inconceivably distant date, all life on our planet will be extinct. But we have a long enough lease to try every experiment, and it is quite possible that the future of mankind may be far more brilliant than the past. Our future, perhaps for a million years, is in our own hands. So you need not discount what I have been saying to you on the ground of a supposed personal bias, which in fact does not exist. I think everybody, except my friend *Punch* and the Americans, is tired of a silly joke made at my expense eighteen years ago.

I dare not talk about Einstein and the Quantum Theory. I should soon get out of my depth, and possibly even of yours. But all these new discoveries make men of science

feel that most of our knowledge is more or less in the melting-pot. The old cocksureness is gone, even in their attitude to theology.

I think it is mainly the difficulty about the fate of the universe that has driven our great astronomer, Sir James Jeans, to something very like Christian theism. Many of you have read his new little book, *The Mysterious Universe*, and you will remember the language he uses. 'The universe can be best pictured, though still very imperfectly and inadequately, as consisting of pure thought, the thought of what we must describe as a mathematical thinker'. After quoting Berkeley, he says: 'It does not matter whether objects exist in my mind, or in that of any other created spirit or not; their objectivity arises from their subsisting in the mind of some eternal spirit'. Again: 'If the universe is a universe of thought, its creation must have been an act of thought. Time and space must have come into being as part of this act. Modern scientific theory compels us to think of the creator as working outside time and space, which are part of his creation, just as the artist is outside his canvas'. As Augustine says, 'God made the world not in time but with time'. Plato says the same: 'Time and the heavens came into being at the same instant, in order that if they were ever to dissolve, they might be dissolved together'.

Now this change in the scientific attitude is very remarkable. Nineteenth-century science called itself agnostic—it made no use of the idea of God; nineteenth-century philosophy was mainly pantheistic: the world was as necessary to God as God was to the world. But here we have one of our leading astronomers going back to the Christian idea of a God who stands towards

the creation as an artist to his works. 'The universe he says explicitly, 'shows evidence of a designing or controlling power that has something in common with our own individual minds'. Creation and time began together ; but creation must have had a date ; otherwise the running-down process which we have described would have come to an end much sooner.

If you read the philosophical and scientific literature of the last century, you will see that this hypothesis of a personal Creator is dismissed as hardly worthy of discussion. Scientists were genuinely afraid of admitting design into the nature of things ; they were wedded to the idea of a mechanical unpacking of what was there all the time. And philosophers were afraid of admitting a one-sided relation between God and the world. If the world is evolving, God must be evolving, too. These assumptions, you see, no longer carry conviction. Christians have always maintained that on purely intellectual grounds the hypothesis of an intelligent Creator is open to fewer objections than any other. We now see that leading men of science regard this belief as deserving of far more respect than was usually paid to it fifty years ago.

I do not want to make too much of this victory. If Millikan succeeds in discovering an atom-building process in the universe, to compensate the atom-destroying process which stokes the furnaces of the stars, astronomers may go back to the belief that the universe had no temporal beginning, and will have no end. That would not do religion any harm. We should only say, 'The world is perpetual, as its Maker is eternal ; unending duration is the moving image of eternity'. But at present the rather depressing prediction of Jeans and Eddington holds the field.

I have shown that the old scientific objections to belief in God are no longer felt to be cogent. 'The word evolution covers unsolved contradictions.' Do we believe in real change or not? If we do, we cannot rule out the idea of purpose. The doctrine of automatic and universal progress, the lay religion of many Victorians, labours under the disadvantage of being almost the only philosophical theory which can be definitely disproved. Agnosticism is an impossible creed. We are as sure about the imponderables as about the ponderables, and we cannot reconcile the difficulties between these two sides of our knowledge by saying that the ponderables are real, and the imponderables dreamland.

Naturalism, based on an abstract study of quantities without qualities, aspired to give us a closed, water-tight system. It is not water-tight; it is leaking everywhere. This would have been realised earlier if the Victorian scientists had not done two things which were to their credit as men, but hardly as thinkers. They took over nearly the whole of Christian—I might almost say of Puritan—ethics, as if their speculations could have no effect in undermining them. They were living on Christian capital; their ethics had no foundation at all. The younger generation of unbelievers has knocked the bottom out of these 'taboos', as they call them, completely.

The other illegitimate method was to deck out the bare bones of naturalism with pantheistic poetry. Some of them were such muddled thinkers that they did not see that they were importing the very values which they had expelled from their real world. The severely mathematical science of the present day will stand no nonsense about poetry and art. Those picturesque giants, Force

and Matter, are gone ; mechanistic science threatens to become a series of mathematical symbols, which are valid whether there is anything corresponding to them in the nature of things or not.

Science, then, is not unfriendly to religion, though some scientists undoubtedly are ; and theology has learned much, and unlearned more, from science. But are the foundations of religious faith secure ? The mediæval schoolmen, who are still authoritative in the Roman Catholic Church, maintained that the existence of God may be demonstrated, not as a self-evident proposition, but as a valid inference. These old fellows never made a mistake in logic ; if you grant their premises you will have to accept their conclusions. But the God whom we want, the Father of our Lord Jesus Christ, is not to be found at the end of a syllogism. These arguments are valuable in clearing away objections ; but the only *proof* of religion is experimental.

Let me explain what I mean. There are three stages in the spiritual life—faith, knowledge, and love. Faith is a venture, a resolution to stand or fall by the noblest hypothesis, a decision because right is right to follow right in the scorn of consequence. But what begins as an experiment ends as an experience. Our venture is found to work ; more and more we learn to know Him on whom we have believed. And so the best men and women—not all of us, by any means—reach the third stage, described by Clement of Alexandria. The first change is from unbelief to faith ; the second from faith to knowledge ; and knowledge, as it passes into love, unites the knower with the known. He who has reached this stage is equal to the angels !

There is nothing unscientific in following the experts,

the explorers of the high places of the spiritual life, when they tell us what they have found. I know nothing more remarkable than the unanimity of the mystics, ancient, mediæval, and modern, Protestant, Catholic, and even Buddhist or Mohammedan, though the Christian mystics are the most trustworthy. They are rather incoherent, because language was not made to describe these experiences ; but they have quite clearly ' been there ' ; they testify that which they have seen. If we object that we have not seen anything of the kind ourselves, let us ask ourselves candidly, Have we deserved to see it ?

And since we have lately had suggestions that we may have religion without a personal God, or without a God at all, it is worth noticing that all the Saints are convinced that their devotions are not merely spiritual dumb-bell exercises or soliloquies. They are sure that they come into real communion with a divine Spirit, who hears their prayers. It is unscientific to disregard such testimony.

The proof of religion, then, is experimental. It is a progressive knowledge of God under the three attributes by which He has revealed Himself to mankind—what are sometimes called the absolute and eternal values—Goodness or Love, Truth, and Beauty.

If that is all, you will say, there is no reason why religion should come into conflict with natural science at all. One deals with facts, the other with values. Granting that both are real, they are on different planes.

This is not quite true. We have seen science poaching upon ethics, poetry, and what not. Religion cannot help poaching either. We have to try to bring the two sides of our knowledge together. We have to build bridges between the world of fact and the world of value. We must have a bridge, for we are constantly crossing from

one side to the other. Myth and ritual are bridges of this sort. The writer of the Epistle to the Hebrews defines faith, in its highest stage, as 'seeing Him who is invisible'. Seeing Him who is invisible—how can we do this without the help of the imagination?

I wish our scientific friends were more ready to recognise that the natural language of devotion is poetry, not science. Poetry has its own way of conveying the truth—higher truth it may be than can be expressed in the language of science—but at any rate a different way.

A man who interrupted a violin solo by saying, 'The fellow is only dragging the tail of a dead horse across the entrails of a dead cat', would be a nuisance. So is a man who wants to bring a test-tube to a Catholic Eucharist. The faithful often use very materialistic language, I know; but the sacrament is a sacred drama for them, and they do not want to have their attention called to the stage properties. Even the main doctrines of our faith—the risen and ascended Christ on God's right hand, the future life, and the abodes of bliss and woe—are all pictorial and symbolical. They are true in their context, not when they are taken out of it. This is what the vulgar rationalist never understands. For him, life is as common and as free from mystery as a bank-holiday crowd.

You remember the nursery rhyme about the Pussy-cat who went to London to visit the Queen. 'Pussy-cat, Pussy-cat, what saw you there? I saw a little mouse under her chair'. That is just all that Pussy-cat does see. If she had tried to describe the Queen in her robes, she might have made a poor job of it; but she can manage the little mouse well enough.

But the astronomers, who contemplate the immensities, are reverent men. They know how astronomy abases

and exalts mankind. 'When I consider Thy heavens, the moon and the stars which Thou hast ordained, what is man that Thou art mindful of him?' And the answer, 'Thou hast made him a little lower than the angels, to crown him with glory and honour'.

XII

L. P. JACKS, D.D., D.LITT., LL.D.

THERE is one important point about science on which I think that most, if not all of us, both listeners and speakers, would agree. It is so obvious that it would hardly be worth mentioning were it not that obvious truths are often overlooked. In these days no one who wilfully neglects the teachings of science can live the good life. To neglect science in the sanitation of London, for example, would be as great a crime as any forbidden by the Ten Commandments. If the London County Council were to do so they would be murderers on a colossal scale. This connection between science and the good life needs to be emphasised. A God who cares for the good life cannot be indifferent to the science so essential to it.

Does it not follow from this that God, assuming Him to exist, is the God of Science as well as of Morality in the narrow sense? Let your science be true and your action upon it wise and courageous. If there are such things as Divine commands this surely is one of them.

We must enlarge our conception of God so as to include science along with right conduct among the pressing concerns of the Godhead. I would also include art, but that is not the subject of the symposium, though it is difficult to keep it out, and I am glad Canon Streeter has brought it in. God commands true science as the basis of right action. He is pleased when the publications of the Rationalist Press are really rational and angry when they are not. He hates false theories as well as evil deeds. He hates jerry-building, both in theory and in practice,

but loves an honest argument and a well-built house. He is the implacable foe of nonsense, ignorance, cant, platitudes, claptrap, loose thinking and bad work.

Matthew Arnold defined God as 'a power not ourselves that makes for righteousness'. That is true but needs to be enlarged. Or rather we must enlarge our idea of 'righteousness' so as to include the pursuit of truth and the expressions of it, and then connect this with our idea of God. God is a power not ourselves that makes for true thinking, and for the intelligible expression of it in speech, print or otherwise, as well as for right conduct in the narrower sense. He hates lies, of course. But he hates obscurity as well. God is Light.

Every speaker in this symposium must have felt that power—the sense of a pressure put upon him, of an urgency, commanding him to think truly about science and religion and forbidding him to talk nonsense. I feel it myself at this moment, and when I have done I shall need forgiveness for any loose thinking I may lapse into and for the points I fail to make clear. I count that a religious experience, and not the less so for being common. I know of none more significant. I know of none more tremendous. And none the less so because it is common.

Unfortunately we have come to think of religious experience as though it were something exceptional—something reserved for a special class called saints or mystics. The newly invented Psychology of Religion is largely responsible for this mistake. Religious experience is woven in with all our experience. To isolate it from the rest of our experience is to misunderstand it.

When this wider conception of God becomes prevalent, as perhaps one day it will, science and religion will be on better terms than they have been in the past, though not

perhaps entirely reconciled. But why should we wish them to be? Both of them are servants of the living God, and what more natural than a running dispute between them as to which of them can serve him best? I suspect that is what they have been quarrelling about most of the time. May we not think of science and religion as 'beautiful enemies', to borrow a phrase of Emerson's? The strife between beautiful enemies is one of the highest forms of friendship I know of—perhaps another name for love.

I should like to connect what I have just been saying with what we heard from Professor Alexander about the sense of the numinous—that dim sense we have of something tremendous in the world about us, something awful and majestic, *mysterium tremendum*, as Otto calls it. With many persons this sense of something tremendous is most active as a felt pressure they can never get away from, urging them to think truly and forbidding them to talk nonsense. 'It seems to rise up from the depths of the universe.

Professor Alexander acknowledges the numinous, but he connects it with something else which I cannot identify with any experience of my own or find recorded in that of other people. I would suggest that our sense of something tremendous has more to do with our feeling of responsibility for truth, which Sir Arthur Eddington lays stress on, than with the conception of an emerging deity introduced by Professor Alexander. Cold comfort is all I can get from that. Apparently we must wait for deity to emerge from mind, as mind has emerged from life and matter. But how long is our waiting to last? Ten years or ten million? And can we be sure that emerging deity is worth waiting for? Might it not be wise to ring

down the curtain before it emerges, on the chance that the day of the Lord when it comes will turn out to be darkness and not light. When I read some of the Hebrew Psalms I cannot help thinking that deity has emerged already, without being observed by the philosophy of emergence.

And that is the real trouble with all of us. Deity is seldom easy to recognise, not even when it emerges, so to speak, under our very noses. It has no official uniform, and never emerges with a label pinned on, like a delegate at a religious conference. The way of the gods is to come in disguise. 'Verily thou art a God that hidest thyself' said the prophet of old.

Many of you will remember that beautiful passage in Vergil when Æneas meets a goddess in a wood. At first she seemed an ordinary woman—if there is such a thing. Then suddenly he recognized she was divine by *her manner of walking*. There was a majesty in her manner of walking that gave her away and revealed the divinity. Most of us are inobservant of such things. When divinity flashes out, we are generally looking the other way. Science describes the walk of the universe, the march of events as we call it; describes them in quantitative terms, the length of the stride, the rate of progression and so on, puts it all into symbolic equations, as Sir Arthur Eddington says, and that is all that most of us take note of. But religion observes the majesty of the walk, the dignity of the march, the rhythm and beauty of the advancing equations, and says at the end of it all, in four words of Vergil's Latin '*vera incessu patuit dea*'. This is the difference between fact and value, to which many of our speakers have alluded.

I doubt if the interests of religion are much promoted by arguments to prove the existence of deity. More

would be done by training ourselves to recognise deity when it emerges. The Indian system of Yoga, I believe, has that object—not to prove the existence of God, but to raise the faculty of insight to the requisite pitch for penetrating the disguises of deity. I have known scientific men who were good observers of everything except the divine, and there are theologians who seem to be in much the same condition. Both would be the better for a course of Yoga, or of something like it. And so would all of us.

This leads me to say a word about the great religions, of the East—the non-Christian ones—whose existence we should never forget when we are discussing science and religion.

Certain of them believe that the world outside us, which science investigates, is an illusion. These religions are founded on inward meditation, not on outward observation, and to them it matters little or nothing what any science has to say about this illusory world. If physics says the world is a vast machine, the machine is only another illusion. If history says that certain events alleged to have happened in the past never happened, what does it matter? Even if the events had happened, they would be only illusion. One is sometimes tempted to envy the philosophical Hindu who has none of the botheration that Christians have in squaring up his accounts with physics and with history. If we cannot imitate him we should at least remember that he exists. In some of the contributions to this symposium I think he has been overlooked. The other day I heard a rather daring adaptation of a saying in the Gospel—daring, but I think not profane. It was addressed to a group of pessimistic Christians who were discussing the possible failure of Christianity and it ran thus: 'Make friends

with the great religions of the East that if ye fail they may receive you into their houses '.

I will next call your attention to the important part played in this symposium by the science of astronomy or, more strictly, the science of cosmology. I regard Sir Arthur Eddington's contribution as the pivot of the symposium. He has led us back to the central question of what is implied in there being such a thing as science at all. It implies the existence of beings who have a felt responsibility towards truth, beings who not only believe this and that, but to whom it matters enormously whether what they believe is truth or error. As a cosmologist he reminds us that these beings, namely you and I, with our responsibilities towards truth, are not outside spectators of the universe, but *in* it and *of* it, bone of its bone and flesh of its flesh. We ourselves are the most interesting products of the universe we are trying to understand, and the most interesting fact about ourselves is precisely that responsibility for truth which prompts our questions and gives birth to science.

We owe him another debt. He has immensely broadened and deepened our vision of human history, of the past of the human race. He has expanded the history of man to astronomical proportions, tracing its roots far beyond the boundaries of what has happened on our little earth into the depths of the stellar universe. Man is unquestionably a child of the *earth*, a product of the evolutionary process which has gone on since the earth came into being. But if you stop there, as the Darwinian stops, as the geologist stops, you have only traced the first step of man's pedigree. For the earth itself has an ancestry which carries it back over unimaginable æons to the time when the morning stars first sang

together. Man is the offspring of all that. His roots penetrate those inconceivable depths and spread out over those immensities. He is, as Plato said, the child of the stars, a son of heaven in an almost literal sense both in body and mind, and not merely terrestrial, not merely the dust of the earth, but the dust of the universe.

And that is not all. There is more in man than the substance of his body. There is in him a profound conviction that truth matters, that he is responsible for it, a conviction of which science itself is the outstanding witness. That also has its pedigree where the rest of him came from. That also has its roots in the universe.

This cosmological outlook seems to me the outstanding feature of our symposium. And here I will say, as bearing on the moral aspect of our discussion, that if I had to pick out a single science for the guidance of my life I would certainly choose the science of cosmology. In the vision of perfect orderliness that it gives me, in the vast amplitudes to which it introduces me, in the mighty forces I see at work, in the steadfastness of their working, to say nothing of the splendour and majesty that everywhere confront me—in all that I find something of infinite value for the guidance of life and for the interpretation of it. Psychology has nothing to teach me in the least comparable to it. I feel sure that the dreadful muddles we get into through dabbling in an inexact psychology, or in immature social science, would get themselves best corrected by a steadfast look at the stars above our heads—Orion 'driving his hunting dogs over the zenith', or Andromeda shaking out her tresses over the immensities of space—and asking what all that means. It would correct our sense of proportion. It would give us a truer perspective.

But I pass on to another point.

Some of the speakers, both lay and clerical, who have dealt with the question of reconciling science with religion, show a marked tendency to give science the leading part in laying down the terms of reconciliation, or, shall we say, in drawing up the treaty of peace. Science is treated by these speakers as virtually master of the situation. Science has won in all the engagements that have been sought so far, and though religion has not been annihilated, she has been taught a sharp lesson. Under these circumstances it is for science to dictate the terms of peace and for religion to accept them. If religion refuses to do so, there is a bad time in store for her.

Professor Julian Huxley is explicit on this point. Here is what he says : ' What science can and should do is to modify the form of religion. It is the *duty* of religion to accept and assimilate scientific knowledge. . . . If religion refuses to do so she will lose influence and adherents '. I take this to mean that the passports of religion are not valid till they have been stamped and visa'd at the scientific consulate. Science is master of the situation.

The Bishop of Birmingham is less exacting, but he has some remarks in the same vein. He would be content with the surrender by religion of magic and myth. Of magic I say nothing because the anthropologists are not yet agreed as to its function. But myth is another matter. Science has myths of her own. Sir Arthur Eddington has told us that physics reduces the universe to a system of symbolic equations. That looks remarkably like a myth. Yet I should never dream of asking science to surrender it. Let nobody speak disrespectfully of equations, of equators—or of myths. Dean Inge has told us why.

The speaker who stands out most conspicuously against unconditional surrender is Father O'Hara. He respects science ; he desires to live on good terms with her ; but he is not going to be dictated to. He will not admit that religion has been brought to her knees by science, or reduced to a condition in which she can no longer make her own terms. At that point I range myself, in principle, with Father O'Hara. I think there is a majesty in religion which forbids her to surrender unconditionally to science. She also has great victories to her credit, victories over suffering and death, in the palace of Gotama the Buddha, in the room where Socrates drank the hemlock, in the Garden of Gethsemane and many another famous battlefield. Between beautiful enemies there should be no surrender on either side.

The next point is the warning conveyed by many of the speakers, directly or indirectly, of the great danger we are all in of becoming the victims of abstractions, formulæ, phrases and words. Matter, force, evolution, survival of the fittest, laws of nature, progress, humanity, mind, spirit—these are some of the abstractions most in vogue, and powers of the most astounding character are ascribed to them in popular discussion. In reality they have no power at all, beyond that of enabling us to think and speak intelligently of the phenomena before us, though that, of course, is a very great service. The danger is, and Sir Arthur Eddington has pointed it out, that if we allow these abstractions to dominate our thinking we end in conclusions which may be logically irrefutable, but are so patently absurd that nobody in his senses can possibly believe them. If you work exclusively with the abstractions of mathematics you end in the conclusion that nothing exists but mathematical equations. If you work

with the abstractions of matter and force you conclude that nothing exists but molecules in motion. If you work with the abstractions of mind and spirit you conclude that nothing exists but your own ideas. If you work with the abstractions of Freud's psychology you conclude that you yourself are nothing but a sublimated product of questionable libidos. Indeed by choosing the abstraction you work with you can come to any conclusion you like and all of them will be absurd and contradict one another. They all end in some preposterous statement that the universe is nothing but this, nothing but that—the philosophy of the nothing-but. Forgive me for being a little dogmatic at this point, for I have no time to elaborate reasons. Philosophies of nothing-but, whether put forward by science or religion, are rank nonsense, and yet not 'nothing-but' that, for they are all intolerant and some are abominable. They are the result of submitting to the stranglehold of words and abstractions. And the laws of the universe are just as hot against nonsense of that kind as against any of the crimes forbidden by the Ten Commandments.

And now I will add two more to the list of abstractions that mislead us ; and perhaps you may be a little surprised when you hear them. One is science and the other is religion.

Science and religion are names for two modes in which human beings express themselves, the mode of knowing and the mode of worship and service ; they are forms of personal activity. Neither of them has an independent existence of its own. Neither of them *says* anything. Neither of them *does* anything. Whatever science is supposed to say, is really said by scientific *persons* ; whatever religion is supposed to say is really said by religious

persons. And the same with what they are supposed to do. Science, we are told, has conferred enormous benefits on mankind. I must deny that, but I admit that enormous benefits have been conferred by scientific men or by those whom they have instructed. In the same way we have been told—by the Roman poet Lucretius, for example—that religion has inflicted untold miseries on mankind. That too I must deny, but I admit with sorrow that some persons, acting in the name of religion, have been among the world's great malefactors. Nor is science irreproachable in this matter. Deeds are being done to-day in the name of science for which some of us would not like to be responsible. Only they are being done not by science, but by men. Personality dominates the whole situation, as Professor Haldane reminds us in another connection.

Let us compare the two persons, the scientific and the religious. The scientific person was admirably described by Sir Arthur Eddington. He is endowed with a keen sense of the difference between truth and falsehood. He is not blind to the difference between good and evil either. Of course not. But the stress of his insight, so to speak, lies in the difference between the true and the false. He regards that as infinitely important; grounds his vocation on it; and lives for the affirmation of it.

How shall we define the religious person? Dismissing his superficial characteristics, as you might define them by the particular church he belongs to, and getting down to fundamentals, the religious man, so far as I can understand him, is endowed with a keen and persistent sense of the difference between good and evil. All his other characteristics, and of course he has many, will be found, when traced to their source, to flow forth from his over-

mastering sense of that difference. He may have all sorts of beliefs about other things, but if you cut them adrift from that master insight of his every one of them will collapse. He is not blind to the difference between truth and falsehood. Of course not. But the stress of his insight is on the difference between good and evil. His sense of responsibility all centres on that.

Turning now to the conflict between the two types it seems to me to resolve itself into a simple and not very alarming form. Neglecting the superficial forms of it, such as the contest about miracles, and following it down to its roots in the personalities that carry it on, we find it to be largely a conflict of rival emphasis, rather than of rival theories. It comes to something like this. The men of science say to the men of religion : ' You are not as attentive as you ought to be to the value represented by the difference between truth and error. You are rather careless about that '. To which the men of religion reply : ' You on your side are not as attentive as you ought to be to the value represented by the difference between good and evil. You don't bring it sufficiently to the front '. I don't mean that they actually say that in so many words. Perhaps it would hardly be polite to do so. But when you take all they do say to one another about other things, about miracles and mechanism and inexorable law and so on, and boil it down to its essence, that is pretty much what it comes to. It looks uncommonly like a lovers' quarrel.

Such being the nature of the conflict, how can it be brought to an end ? In one way only, so far as I can see—*by each side resolutely going on with its own work*, the one of affirming truth against error, the other of affirming good against evil, making no attempt to force a verbal

reconciliation, but confident that the deeper they get into their business the nearer they will approach one another, until finally they meet at the same point and discover that all along they have been serving the same cause and obeying the same master. They will meet, I think, in the creation of Beauty, the name of the Divine Excellence, the vitalising element of the divine triad, in which the True and the Good are the other two. Practical outcome—a civilization devoted to the pursuit of excellence along the myriad paths where excellence is attainable. .

I wish we could get rid of all this botheration about the future of religion, this anxiety for the morrow of it. If we really believe, as some of us profess to do, that God fills the universe, who, I should like to know, is going to turn Him out of it? Even suffering and death, which have been in the world from the beginning and will be to the end, have not been able to do that; and these two, when you come to think of it, suffering and death, are vastly more formidable than the arguments of atheists or the anti-religious decrees of the Soviet Republic. The religion which has survived ten thousand years of suffering and death will not readily succumb to anybody's logic or to anybody's legislation.

None the less we have to 'cultivate our gardens', as Candide so aptly remarked to his pantheist companion; the garden of Truth as men of science, the garden of Good as men of religion, hoping, perhaps even believing, that some day through our joint operations the waste places we are cultivating will break forth into Beauty and the desert blossom like the garden of the Lord.

Meanwhile let none of us imagine, as many did in the last century, that the progress of mankind is going to be a walk-over, or a comfortable ride home on the back of

a friendly monster named ' evolution '. There will be hard fighting all along the line. Somebody will always be getting hurt. And when the prize is won, if ever it should be, valiant men will still be needed to risk their all in guarding the treasure from corruption and spoliation. Then, as now, courage will be our only security, both for science and for religion.

INDEX

As a rule, the first mention only of a subject in each talk is given. Some subjects (truth, personality, materialism, etc.) are omitted as occurring actually or implicitly in every talk.

- animism 66
- Aristotle 10, 33
- Arnold, Matthew 160
- art 17, 102, 159
- astronomy 10, 98, 117, 145, 164
- Augustine, St 87, 144, 151
- Avebury, Lord 66

- Bacon, Francis 35
- Balfour, A. J. 88
- Bennett, Arnold 146
- Berkeley, Bishop 151
- Boyle, Robert 107, 109
- Brahe, Tycho 108⁴
- idges, Robert 27, 86
- Bryan, W. J. 72
- Buddha, Buddhism 3, 4, 103, 155, 167
- Burke, Edmund 140
- Butler, Samuel 147

- Cairns, D. S. 89
- Clement of Alexandria 154

- Coleridge, S. T. 5
- comparative religion 2, 65, 75, 132
- Copernicus 31, 108, 145

- Darwin 10, 17, 27, 30, 31, 109, 145, 149
- death 51, 55, 67, 90, 93, 171

- Eddy, Mrs 79
- Einstein, Albert 31, 43, 111, 123-4, 145, 150
- emergence 50, 61, 135, 149, 161
- Emerson 161
- Euler 109
- evolution 13, 29, 39, 57, 147, 164, 172

- fetishism 3, 70
- Frazer, Sir James 66, 71
- free will 51, 63, 108, 125, 147
- Freud 10, 168

- fundamentalism 30, 57, 72, 143
 Galileo 10, 17, 73, 145
 Geddes, Patrick 36
 Huxley, T. H. 38, 146
 immortality 4, 50, 66, 75
 Jeans, Sir James 48*n.*, 98, 145, 151
 Kant 44, 46
 Kelvin, Lord 89
 Kepler 10, 17, 108
 Lang, Andrew 66
 Langdon-Davies, John 10, 32
 La Place 77
 Lightfoot, Bishop 30
 Lindsay, Principal 89
 Lucretius 169
 magic 6, 27, 57, 70, 139, 166
 Marett, R. R. 5
 Maupertuis 109
 Millikan, R. A. 150, 152
 Milton 2
 miracles 57, 77, 112, 126, 146, 170
 Mivart 146
 Morgan, C. Lloyd 135, 148
 Myers, Frederic 87
 myth, mythology 36, 58, 103, 140, 156, 166
 Napoleon I 77
 Newton 10, 11, 13, 17, 31, 145, 147
 'numinous', the 133, 161
 Otto, Rudolf 133, 161
 Paley 11
 pantheism. 50, 61, 136, 151, 153
 Paul, St 9, 87, 105, 140
 Pavlov 10
 'picture of the universe' 2, 48, 109, 119, 151
 Planck, Max 111
 Plato 151, 165
 Pope, Alexander 30
 psychology 13, 44, 128, 132, 160, 165
 relativity 21, 44, 123
 revelation 47, 78, 113

- ritual 66, 156
- Rossetti, D. G. 123 •
- Russell, Bertrand 97-8
- sacredness, sense of 3, 26, |
69, 133
- Shakespeare 147
- Smith, Joseph 79
- Smith, Robertson 66
- Smuts, J. C. 41
- Socrates 167
- space and time 14, 46, 60,
107, 117, 151
- Spencer, Herbert 149
- Tylor, E. B. 66
- Vergil 162
- vitalism 41, 99, 120, 135'

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